Healthy higher density living:

A review of the literature

OCTOBER 2018

LANDCOM

Creating more affordable and sustainable communities

Authors

Irena L. C. Connon (UTS), Jason H. Prior (UTS), Jennifer L. Kent (USyd), Leena Thomas (UTS), Susan M. Thompson (UNSW), Erica McIntyre (UTS), Jon Adams (UTS), Anthony Capon (USyd), Chris Rissel (USyd), Harriet Westcott (USyd).

A Literature Review undertaken as part of the Healthy Higher Density Living collaborative research project involving the University of Technology Sydney, University of Sydney, University of New South Wales, and conducted in partnership with Landcom.

Context of this Literature Review

This literature review was undertaken as part of the Healthy Higher Density: Translating Evidence to Support Planning Strategies for Healthy Higher Density Living research project. This $1.3 million AUD two-year project is being run from the University of Technology Sydney, University of Sydney, the University of New South Wales, and in partnership with Landcom, New South Wales. The project seeks to advance knowledge of ways to plan higher density precinct developments to improve health by enabling industry to identify how health and wellbeing can be integrated into higher density precinct development policies and practice.

Acknowledgements

The Healthy Higher Density Living research project of which this literature review forms a part is funded by Landcom. The authors are grateful to Landcom for their partnership and support with the completion of this literature review.

For further information on this report

Dr. Irena L C Connon,
Research Fellow,

Institute for Sustainable Futures,
University of Technology Sydney

Level 21, Building 1, 15 Broadway, Ultimo NSW 2007

t: +61 (02) 9514 4963
e: Irena.Connon@uts.edu.au

Citation

Please cite as:

Connon, I. L. C., Prior, J. H., Kent, J., Thomas, L., Thompson, S. M., McIntyre, E., Adams, J., Capon, A., Rissel, C., Westcott, H., (2018), Healthy Higher Density Living: A Review of the Literature. Landcom: Sydney, Australia.

ISBN: 978-0-6483595-4-8

Contents

List of Tables

List of Key Terms and Definitions

Built Environment

Refers to elements of the physical environment situated in space that have been modified into buildings and infrastructure by people for functional use (Macaulay et al., 2011, in Haigh et al. 2011: 9)

Co-benefits

The term is used widely in the climate literature to describe primary or secondary integrated benefits

Density

Definitions vary and there is no consensus on which variant is most appropriate. However, it is used as a quantitative or qualitative measure of a particular activity or a geographic area

Determinant of Health

Influencer of health outcomes and includes factors such as access to safety or access to open spaces

ERA 2015

Abbreviation for Excellence in Research Australia 2015, published by the Australian Research Council

Global Health

An area of study that focuses on the health of populations and prioritises improving health for all people worldwide

HHD

Healthy Higher Density. Used as an abbreviation for the Healthy Higher Density Living research project

Higher Density

There is no consensus on what constitutes a higher density

Environment; however, the term can be used as a quantitative or qualitative measurement of space and is most commonly used to refer to refer to a heavily populated area or area characterised by high rise apartments that stand in contrast to the low rise dwellings that characterise low density environments.

Interdisciplinary

Interdisciplinary studies and activities involve the combining of two or more academic disciplines into one activity

Inter-institutional

Activities that take place between different institutions

Land Use

Refers to location and type of activity within a geographic area, such as residential, commercial or recreational

Liveability

A term used to describe factors associated with overall quality of life

Multidisciplinary

A study or activity that involves combines several academic disciplines

Place

Refers to the historical and social (community) relationships that exist within an area or space

Planetary Health

Conceptual framework of health that frames the health of human civilisation on the state of the natural systems upon which it depends (McMichael et al., 2009)

Planning Strategies

Refers to a range of activities involving the development of plans, tools and actions by planning professionals

Socio-Ecological Determinants of Health

A coherent system of physical and social environmental factors that interact. The term is used as a conceptual framework for understanding the links between elements of a social system (factors) and the physical environment within this system.

Space

Physical nature of an area and infrastructure available

Transdisciplinary

Transdisciplinary research or activity involves researchers from multiple disciplines and people from multiple institutions to solve a problem in way that takes a shared approach to defining and resolving the problems.

Urban Form

Refers to the quality of the built environment and related to the density and use of land within urban areas.

Executive Summary

Background

This literature review was undertaken as part of the Healthy Higher Density: Translating Evidence to Support Planning Strategies for Healthy Higher Density Living research project, which seeks to advance knowledge of ways to plan higher density precinct developments to improve health by enabling industry to identify how health and wellbeing can be integrated into higher density precinct development policies and practice.

This literature review of academic publications will be later accompanied by a review of government, industry and policy literature, which was not included within the scope of this study, specifically for two case study sites chosen for the Healthy Higher Density Living project – Victoria Park and Green Square.

Aim and purpose

This review aims to provide an overview of the range of academic articles that focus on health and planning for higher density living. The review was focused on answering two principal questions:

1. **What is meant by healthy higher density living?**
2. **How can planning strategies support healthy higher density living?**

In addressing these questions, the review asks a series of conceptual questions, such as how higher density living is defined within existing literature, how health is conceptualised within the academic literature, and what is meant by the term planning strategy.

The purpose of this literature review is to inform the research project by providing recommendations on: 1) how to define and conceptualise healthy high density, 2) how to improve existing planning strategies for higher density living, and 3) provide an understanding of how these recommendations will be actioned within the research project plan.

Methods

A combined systematic and narrative content-analysis inductive approach was used to conduct the review. A total of 141 papers were identified as relevant for the purposes of the study. The 141 relevant articles were sourced from a broad range of journals, which evidences the transdisciplinary nature of the research themes. The journals that the articles were sourced from included multidisciplinary journals and journals pertaining to a wide variety of diverse

academic disciplines, including: Urban and Regional Planning, Human Geography, Public Health and Health Services, Engineering, Environmental Engineering, Chemical Science, Sociology, Environmental Science, Design and Management Studies, Medicine and Health, Sociology, Sports Science, Paediatric Studies, and other studies in Human Sciences.

Summary of findings:

What is meant by the term Healthy Higher Density Living?

With the exception of Giles-Corti et al. (2014), no specific concrete definition or statement as to what constitutes 'healthy higher density living' was provided. However, the meaning of healthy higher density living was ascertained from the attributes used to describe a higher density environment in contents of the literature. Within the remaining literature two main approaches are used to define 'higher density' living. These are:

1. According to a specific spatially defined and quantified set of criteria (12 out of 141 articles);
2. Descriptively and in opposition to low density living environments and the poor health outcomes associated with low density living (14 out of 141 articles);

The majority of articles failed to provide any clear definition of higher density living (116 out of 141 articles)

Recommendations

The following recommendations were made based on these findings:

1. To develop a definition of higher density that aligns the existing quantitative and qualitative descriptors and attributes that the literature associates with higher density urban environments. This would help to ensure consistency across the different academic disciplines and across government and private sector organisations in how high density is defined by both planning and health professionals. This definition should include the following:

- A specific measurement of the number of units per area that can provide consistency to what is meant by a higher density environment;
- A description of qualitative characteristics that can be used to define a higher density living environment, such as the number of storeys of a high-rise building;
- A clear description of the particular forms of urban living associated with this type of living environment.

In addition:

- The definition should specifically capture the relevance of higher density living within a 21st century global context, but should also be appropriate for an Australian context.

2. Build upon and expand Giles Corti et al.,'s (2014) basic definition of healthy higher density environments by looking beyond the quantifiable markers of space required to promote active living to improve mental and physical health outcomes to the qualitative features that enhance healthy lifestyles in higher density settings.
3. Develop the definition of higher density environments so that it specifically includes descriptors of the natural environment health and characteristics of the built environment that are particular to higher density living environments.
4. Compile an evidence-base from the academic literature and relevant government and planning literature to understand how the meaning and relevance of higher density living has changed over time and across different contexts in response to changing demographic trends and public health challenges.
5. Find out through discussions with academics from a wide range of disciplines, including planning, public health and urban studies, and with planning and health professionals from a range of organisations in New South Wales Australia, what the relevance of higher density living is from the perspective of meeting 21st century global challenges. This will help to identify a clear definitive purpose for higher density built environments within the rubric of health, which will help to provide a definition that is both place-based and health-focused.

Actions

The following points of action were developed from the recommendations:

1. Undertake a transdisciplinary problem-solving workshop with academics from wide range of disciplines and professionals from a range of government and private sector organisations to develop an integrated definition of high density
2. Undertake a context study of evidence obtained from government and planning literature
3. Undertake a series of interviews and focus group workshops with planning professionals to understand how high density is currently understood in planning practice and to develop and embed the new definition

What are the key conceptual perspectives of Healthy Higher Density Living?

What is regarded as being important for healthy higher density living varies according to the theoretical approach to conceptualising health that each article is embedded upon. Healthy Higher Density Living can be defined in accordance with each theoretical perspective as:

1. **Global Public and Population Health** – According to 14 articles out of the 141 articles within the sample, healthy higher density living is characterised by environments that: a) are responsive to global and local public health challenges that result from increased urbanisation, b) promote positive physical health outcomes, c) promote positive mental health outcomes, and d) are designed with long-term population health in mind
2. **Social-Ecological Determinants of Health** – According to 109 articles within the 141 sample of articles, healthy higher density living environments: a) promote 'liveability' to enhance human wellbeing, b) promote positive physical outcomes through a 'pathway' approach to enhancing health outcomes, c) Improve mental health outcomes through the design of the built environment, and d) are designed to enhance human health equity
3. **Planetary Health**: Twenty out of the 141 articles suggest that healthy higher density living: a) involves co-benefits approach to environment and health, b) is characterised by a holistic relational approach that recognises complexity in human and environmental relations as well as the interplay between mental and physical human health in determining quality of life, c) is responsive to anthropogenic climate change, and d) promotes environmental sustainability through the design of the built environment.

The review shows how these different theoretical approaches of health lead to varying conceptualisations of what is meant by the term healthy higher density living.

Recommendations

Differences in the theoretical grounding of the articles influences suggestions made for improving general approaches to planning policy and practice and recommendations about specific direct actions that can be taken to enhance health outcomes. In terms of the Healthy Higher Density research project, the sample literature highlights a key opportunity for drawing together the three main theoretical perspectives of health in developing a new approach to planning for healthy higher density living.

1. Create a standard definition of health that unifies and aligns the priorities of each of the three approaches to health. This definition should:

- Incorporate the different conceptualisations of mental health, physical health, environmental health, quality of life and wellbeing to ensure that the definition of health encompasses the insights provided by the three different approaches to health.

2. Create a definition of a healthy higher density environment that draws on the different perspectives to identify characteristics associated with healthy higher density living, such as access to green space, transport links and mixed land use.
3. Develop a conceptual framework of health that illustrates all the different attributes associated with health suggested by each

of the different perspectives and the interactions between the different factors. This should involve:

- Identifying how the different characteristics and attributes outlined in the literature associated with health outcomes in higher density context fit within the conceptual framework;
- Mapping the interactions between factors for different case study sites to develop a co-benefits framework that identifies the relationship between factors that influence health and the co-benefits between the social and environmental influencers of health to provide a visual representation of the relationship between health and place;
- Working with a researchers from a broad range of academic disciplines and in partnership with health and planning professionals to develop and refine the framework as part of a transdisciplinary co-learning activity;
- Focusing on identifying the particular contemporary health challenges that higher density living relates to within the conceptual framework; for example, climate change, gendered health inequality, environmental degradation, urban population growth, and changing demographic profile.

4. Develop a methodology for identifying the different factors and attributes associated with enhancing health outcomes, and for measuring health outcomes and the subjective as well as objective elements of health that goes beyond using evidence from randomised control studies. This methodology needs to be one that can be tested and applied within a practical planning context:

- This can involve developing an evidence base of health challenges within specific case study contexts that can be conceptualised within the framework; and
- Development of an evaluative strategy to evaluate the transferability of health evidence into interventions in higher density precinct settings; which
- Should involve using both qualitative and quantitative methods for measuring health and quality of life, and
- Should focus on measuring and evaluating outcomes from different temporal perspectives, including the more distant long term outcomes as outlined by the Planetary Health approach;

5. Embed the conceptual framework into a range of planning policy and practice documents and activities to aid the development of health informed evidence-based planning strategies for higher density living. This should involve:

- Embedding the conceptual framework to test its effectiveness in practice;
- Revising the framework as appropriate;
- Developing a checklist for planners to use to implement this conceptualisation of health into planning policy and practice;
- Developing a communications strategy for communicating this framework to planning and health professionals from a wide range of institutions

Actions

The following actions will be undertaken to develop these recommendations within the scope of the project:

- Undertake a review of Government, Industry and Policy Literature pertaining to the New South Wales context to explore how health is currently being conceptualised within planning policy documents and to examine if this conceptualisation has changed over time.
- Conduct an evaluation of existing planning policy with particular reference to the Green Square and Victoria Park case study sites to identify opportunities for expanding upon and challenging existing perspectives of health drawing on the attributes and approaches to health detailed in the literature.
- Organise a series of workshops that bring together a range of planning professionals and academics from a variety of academic disciplines to collectively develop a new conceptual framework and to map the different attributes associated with health in higher density contexts into the framework.
- Identify existing conceptual frameworks for Public Health, Socio-Ecological Determinants of Health approaches and Planetary Health approaches that can then be used to help develop the new conceptual framework for health in higher density contexts.
- Work with planning professions to develop the checklist and communications strategy, particularly how it can be communicated to professionals associated with planning who planners do not have direct influence over.
- Conduct interviews with planning professionals to understand how 21st century public health challenges, such as climate change and population growth, are currently being understood and addressed within the planning context.
- Conduct focus group workshops to foster collective discussion about how the promotion of human health can be better aligned with environmental health through the promotion of higher density living developments.
- Conduct further research to identify a suite of evaluative and measurement tools that can be used to construct an evaluative framework and work with members of the project team to identify a framework for measuring subjective as well as objective dimensions of health.
- Identify potential existing outlets for the conceptual framework. For example, through revised versions of existing guidelines for health promotion, revised versions of needs assessments or within existing health impact assessments, and identify new opportunities for disseminating and implementing outputs through other communication channels, including presentations at national and international conferences, appropriate media outlets and through the publication of academic articles.

How can planning strategies support healthy higher density living?

The literature presents a number of suggestions as to how planning strategies can support higher density living. Ideas and suggestions are framed in accordance with the specific underlying theoretical conceptualisation of health that each article is embedded upon. Recommendations from each of the three theoretical perspectives are broken down into two categories:

1. Suggestions for improving approaches to the development of planning strategies at the bureaucratic level

2. Specific design and action interventions that can be undertaken to enhance the development of healthy higher density living through planning strategies.

Recommendations

The following recommendations for the following stages of the Healthy Higher Density Living project can be made based on the analysis of the evidence from the literature:

1. Examine how existing understandings and conceptualisations of health are embedded within current New South Wales planning strategies. This will be achieved by looking at how health evidence has previously been incorporated into bureaucratic strategies, and at how health has been incorporated into legislation, policies, plans, guidelines and tools, in order to define the baseline from which to develop and implement new strategies and approaches.
2. Examine how existing understandings and perspectives of health are currently utilised in design and action-orientated planning strategies including land use policies, building controls, standards for green space, open spaces, infrastructure related to transport, energy, water and education, design techniques, site selection, building design, built environment features, and resident engagement in place-making activities. This will provide a second component of the baseline data from which to evaluate the implementation of new strategies and approaches.
3. Develop a new approach to improving existing planning strategy for enhancing health outcomes that brings together the suggestions raised from each of the theoretical perspectives of health into a unified framework embedded upon a unified conceptualisation of health. This new approach will be developed by drawing upon the recommendations outlined in the literature and the evaluation of existing strategies,
4. Conduct interviews and focus groups with a range of planning professionals to develop an understanding of the limitations of current approaches to planning strategy development in a practical context and to tailor the development of a new approach to planning strategy development in a way that best aligns with the needs of current planning professionals
5. The new approach will be developed by working from existing areas of overlap between the different perspectives of health to identify and define key areas of intervention at the bureaucratic level, including: scale of approach, institutional involvement, use of evidence, temporality of approach, conceptualisation of relationship between society and the built environment, and conceptualisation of the relationship between society and the wider natural environment.
6. Create a holistic intervention framework that unifies the different priorities of health for planning for healthy higher density living that incorporates the different suggestions for improving the design and action-intervention strategies emphasised by each of the theoretical approaches to health.
7. Design and develop the new approach through collaboration with a wide range of planning and health professionals and academics from a range of disciplines using a co-learning approach to problem solving.
8. Implement the suggestions comprising the new approach to strategy development at both the bureaucratic and design and action-intervention level.

9. Test the applicability of individual strategies within the new approach and refine accordingly.

10. Develop a framework for measuring and evaluating the success of particular strategy developments, drawing on information in the literature about developing new ways to evaluate subjective as well as objective forms of health evidence.

11. Identify barriers to implementing the approaches and suggestions for improving strategy developments, and work with planning and health professionals and academics from different disciplines to suggest creative ways to overcome challenges.

Actions

The following actions will be undertaken in light of these recommendations:

- Conduct a review and analysis of existing planning documents pertaining to current planning strategies in New South Wales to explore how health has been incorporated into existing legislation, policies, plans, guidelines and tools for higher density living to identify limitations of existing approaches at the bureaucratic level
- Repeat the review and analysis described above for existing design and action-intervention strategies
- Work with academics from a range of disciplines to align suggestions for improving planning strategy development into a cohesive approach that draws together the different perspectives on health to improve health for higher density living
- Identify opportunities and approach for the implementation of a planning strategy development
- Explore technologies and processes based on their disciplinary expertise that can be brought to the new healthy planning strategies to realise them in real-life
- Involve undergraduate and postgraduate students in the testing and refinement of new strategies as part of education-focused, transdisciplinary approach to challenging existing assumptions about health and the use of health evidence in planning practices by working with the coordinators of various undergraduate and postgraduate degree programmes across the three Universities in planning, architecture, public health, urban planning and environment and sustainability.
- Seek to involve TAFE construction students in the testing and implementation stage by working with the Landcom education outreach officer and identifying specific courses that that the project activities can align with; for example, design and construction.
- Consult and meet with representatives from a project reference group that includes key government and industry stakeholders to seek their involvement and expertise in the development of new planning strategies and approaches to strategy development, including Local Health Districts, and the NSW Department of Planning and Environment.
- Identify new opportunities for disseminating new strategies within the wider Australian and international context through a variety of communication strategies, including presentations at national and international conferences, appropriate media outlets and through the publication of academic articles.

Conclusion

The recommendations and points for action developed from the findings of this review contribute to the development of phase two of the Healthy Higher Density research project, wherein the project will develop and implement a framework designed to evaluate the long-term impacts of healthy planning strategies in two high density developments in two case study sites in Sydney, New South Wales, Australia. Development of the recommendations into actions should not only help to develop new understandings of how health evidence can be effectively translated into planning strategies for higher density precinct development, but will also help to create a collaborative inter-institutional, action-oriented transdisciplinary learning partnership between researchers from a wide range of disciplines and diverse institutions with interests in supporting innovation in healthy planning policies and practices for higher density precinct developments.

This review of the literature therefore highlights the key opportunities for drawing together the three main theoretical perspectives of health in developing new approaches to planning strategy development for healthy higher density living within phase two of the Healthy Higher Density research project. It also showcases the range of suggestions that phase two of the project can draw on to evaluate current planning approaches, policy and practice in the two case study sites in Sydney, New South Wales.

1. Introduction

1.1 Background

This literature review is part of the Healthy Higher Density: Translating evidence to support planning strategies for healthier higher density living project.

This research project:

Provides an understanding of how health evidence can be used to plan higher density precinct developments to enhance population health, so that;

Planning strategies can be developed that apply health evidence within planning for higher density development.

This two-year collaborative research project is being carried out by the University of Technology Sydney (UTS), University of Sydney (UniSyd), the University of New South Wales (UNSW), and in partnership with New South Wales Landcom (Landcom).

The Healthy Higher Density research project aims to provide significant benefits to scholarship, the public and industry through advancing knowledge of ways to plan higher density precinct developments for health that aim to improve the health of the growing population by enabling industry to identify how health and wellbeing can be integrated into higher density precinct development policies and practice.

This literature review was developed at the outset of the project to understand what is currently meant by: a) the concept of healthy higher density living, and b) planning for healthy higher density living. The literature review aims to underpin the project's development and implementation of a framework designed to evaluate the long-term impacts of healthy planning strategies in two high density developments in two case study sites in Sydney, Australia,

1.2 Aim and purpose

This review aims to provide an overview of academic journal papers that focus on health and planning for higher density living. The review was focused on answering two principal questions:

What is meant by healthy higher density living?

How can planning strategies support healthy higher density living?

In addressing these questions, the review asks a series of conceptual questions, such as how higher density living is defined within existing literature.

The purpose of this literature review is to inform the research project by providing recommendations on how we evaluate the effectiveness of planning strategies for healthy higher density, and provide an understanding of how these recommendations will be actioned within the research project plan.

1.3 Structure of Review

Following this introduction, the remainder of the literature review is divided into four sections:

- **Section 2.0** outlines the methodology of the literature review, including scope.
- **Section 3.0** presents the results from the first research question: What is meant by healthy higher density living?
- **Section 4.0** presents the results from the second research question: How can planning strategies support healthy higher density living?
- **Section 5.0** concludes the review by linking the results from the two research questions and discussing their relevance for the next steps in the Healthy Higher Density research project. The limitations of the review are also discussed in this final section.

2. Methodology

The literature review adopted a combined systematic and narrative content analysis and inductive approach. The systematic review drew on Bryman's (2012) approach to conducing a systematic review in the Social Sciences.

Bryman (ibid) defines the steps in a systematic review as:

1. Defining the purpose and scope of the review
2. Seeking out refereed journal papers relevant to the scope and purpose of the review
3. Assessing the relevance of each refereed journal paper for the research questions
4. Appraising the quality of the studies
5. Extracting the results of each study and synthesising the findings.

Furthermore, the review used a combined systematic, narrative and inductive approach, which was selected as the most appropriate method for addressing the specific research questions. This was considered to be most appropriate as it allowed the literature review to be conducted in a way that adheres to the key principles of systemic reviewing, which entails transparent, comprehensive and systematic practices throughout the search, while simultaneously allowing for subjective evaluations of the literature to determine relevance, as well as to enable dominant themes to be deduced from the literature (Snilsveit et al., 2012)

2.1 Defining the purpose and scope of the review

The purpose of the review was to understand how refereed academic journals address the research questions specified in Section 1.2.

The scope of the review included articles that focused on:

- Health and high-density in the developed world context.
- Original empirical research articles including case studies from Australia and other parts of the developing world including the UK, US and China;
- Theoretically focused articles, expert opinion articles, commentaries, conference papers and conference proceedings, academic magazine articles, and literature reviews of existing studies.

Only articles written in English were included. The scope of the literature review excluded:

- Healthy urban planning in low and medium density environments, unless they also include reference to high-density.
- This was the case even in instances where the research outcomes presented in this literature had identified best practices and strategies for enhancing health through the built environment that may be potentially applicable in the high-density development context.
- Policy documents, site literature and government and industry documents (grey literature). Book reviews, books and book chapters were also excluded from this review.

2.2 Seeking out refereed journal papers relevant to the scope and purpose of the review

This was carried out in two stages. Stage one involved database searches, and stage two involved a more detailed analysis of the literature that emerged from the data base searches.

The search process, including the selection of databases and search terms, was undertaken rigorously and systematically between February and April 2018. A broad list of 12 databases were drawn up to reflect the transdisciplinary nature and translational dimension of the research problem. These were:

1. Scopus (Social Science, Environment, Health, Planning),
2. Medline (Health and Medicine),
3. Science Direct (Environment, Health),
4. Sociological Abstracts (Social Science, Urban Studies),
5. Health Collection Database (Health, Medicine)
6. Web of Science (Health, Environment),
7. Wiley Journals Database (Planning, Urban Society, Architecture, Urban Planning, Social Science, Inter-institutional Research, Inter-disciplinary Research),
8. APAIS Health and Australian Public Affairs Database (Policy-relevant Research, Health, Public Health, Translational Research, Planning, Legislation),
9. ATRI Transport Database (Transport, Planning, Urban Planning),
10. Health and Society collection (Health, Social Science)
11. Humanities and Social Science Index (Social Science, Urban Planning, Design, Humanities),
12. Urban Studies (Social Science, Built Environment, Urban Planning, Urban Society, Urban Transport).

This list includes databases that focus predominantly on health and medicine and others that focus on the social dimensions of health, urban planning and transport, and the environment and health. Given the transdisciplinary nature of the project, it was important to access this broad, multidisciplinary list of databases. In addition, as different databases host different journals, it was essential to search a wide range of databases to ensure a greater likelihood that all relevant articles would be found from the database search. Each of the databases could be readily accessed from the University of Technology Sydney and the University of Sydney's e-library and each were listed on the library catalogue under 'databases'.

Five key themes pertaining to the focus of the two research questions were identified as representing the domains of the study:

1. Higher density development
2. Planning
3. Health
4. Environmental sustainability
5. Methods (incorporating translational research).

Higher Density Development was identified as the primary focus of the research, where the other domain areas converge on.

Specific keywords were drawn up for each of the domains. These were Higher Density Development, Higher Density Development Planning and Health, Higher Density Development Environmental Sustainability, Higher Density Development Environmental Sustainability Planning and Health, Higher Density Development Methods, and Higher Density Development Health Planning Methods.

The specific focus on High Density within each domain helped to limit the scope of the search. A second set of keywords were then drawn up to reflect thematic subdomains that did one or more of the following: 1) enabled specifying of the topic context and/or geographic area, e.g. 'Urban' and 'Metropolitan', 2) related to institutional or bureaucratic actions, processes and outcomes, e.g. 'Research', 'Policy', 'Strategy', 'Tool', 'Legislation, or 3) referred to actions and processes relevant to individuals and/or groups, e.g. 'Walking', 'Cycling', and 'Gardening'. Subdomain keywords could apply to one or more of the key domains. 119 subdomains were identified. A complete list of the domains and subdomains used to develop the keywords are listed in Appendix 1.

The databases were divided between members of the project team for conducting the keyword searches. Databases were accessed via the University of Technology Sydney and The University of Sydney online libraries. As neither University library had access to the Urban Studies database, this database was excluded from the search at this stage. The search was conducted using the broad domain keywords and using each of the subdomain keywords with each of the broad domain keywords: ("High density development" OR "High density development health and planning" OR "High density development environmental sustainability" OR "High density development environmental sustainability planning and health" OR "High density development methods planning and health" OR "High density development methods") AND ("Australia", "Metropolitan", "Policy") (as examples of the 119 subdomain keywords).

A total of 714 keyword searches were performed for each of the remaining 11 databases ("6 domains" AND "119 subdomains"). The total number of keyword searches completed was 7845. Each database was searched using the same list of search terms. Tables were drawn up to record the number of hits for each of the searches per domain and subdomain for each individual database. These are included in Appendix 2. Keyword searches were saved and recorded in instances where databases permitted it possible to do so. The results indicated the spread of the literature in different topic areas.

The articles were then scanned to ensure relevance. First, by checking for inclusion of key terms in the abstract, introduction and keywords. Second, the remaining papers were scanned to check if they addressed the topic but used other words to do so. Any remaining articles where the relevance remained uncertain was read for review. Relevant articles were saved into a project Endnote database. As several of the databases returned a significant number of duplicate and irrelevant articles, duplicates were removed from the Endnote database and a specific inclusion/ exclusionary criteria was developed drawing on Weaver et al's (2002) methodology for conducting a systematic review. Selection of articles for inclusion into the pool of relevant articles was made on the basis of:

1. Geographic context of the articles;
2. The extent and relevance of their focus on themes of a) health, b) environment, c) subsistence, d) education, e) human values, actions, beliefs and emotions, f) population, and g) governance;
3. The relevance of an article's a) methods and b) tools, within the context and scope of the Healthy Higher Density project;
4. The year of publication and its relevance to the contemporary context and scope of the project.

Full details of the criteria that was applied to limit the inclusion pool to the articles most relevant for the purposes of the study are listed in Table 1, Appendix 3.

Selection was made from the abstract, title and by scanning the contents of the article. Documents meeting one or more selection criteria were included in the pool of relevant articles. A total of 53 articles were selected for inclusion from the systematic database search. While the search on the topic of health aimed to capture as many factors associated with health as possible, including disease epidemiology and disease prevention, articles which discussed smoking, palliative care, sexual health, breastfeeding, malnutrition and disease prevention from a purely medical standpoint were excluding if they did not discuss these issues in relation to urban public health and made no mention of how these health factors relate to aspects of the built or social environment. This was to ensure that only articles that directly relate to the research questions were included in the final sample.

Following the database search, a review of Giles-Corti et al.'s (2012) report on Health and High Density was undertaken. This was then followed by a narrative search of articles and report that have emerged from the Giles-Corti et al. (2012) report. This involved conducting a citation search via Google Scholar to obtain a list of articles and reports that refer to the Giles-Corti et al., (2012) report. Thirty-five citations were listed. The abstracts and titles of these documents were then read to assess for relevance and inclusion. Twenty-six of the 35 sources were deemed relevant for the purposes of the review.

A Google Scholar search was then also undertaken searching for articles using the keywords "High-Density Health Planning" to see if any additional articles not captured in the database searches and narrative review were highlighted. Two relevant articles resulted from this search; however, each had already been retrieved and incorporated into the pool from the database and narrative reviews.

A further narrative review was undertaken by searching the bibliographies of Easthope and Judd (2010) and Haigh et al.'s (2011) literature reviews for additional relevant articles. After reading the abstract to check the relevance of these, all 45 of the further additional sources identified were selected for inclusion.

Finally, an additional narrative review was undertaken of bibliographies and citations of the 45 additional sources. From this, a further 17 sources were selected for inclusion. That brought the total of references selected for inclusion up to 141.

2.3 Assessing the relevance of each refereed journal paper for the research questions

Each of the articles included in the pool were then thoroughly read to search for specific evidence in relation to the two research questions. Articles were organised into three categories in terms of their relevance to the research questions, with articles referring directly to high density and health being categorised as 'highly relevant', articles referring to the relationship between health and density more broadly categorised as 'relevant', and articles

that indirectly refer to the relationship between health and density while focusing on other topics being categorised as 'partially relevant'. An annotated bibliography was compiled that included a brief description of the contents of each article. Articles were scanned for specific definitions and wider approaches to conceptualising and measuring density, including qualitative definitions or conceptualisations of density. To understand how health was defined in the sample literature, an inductive approach was taken to code each article according to a narrative analysis of the contents of the literature sample (See section 2.5).

2.4. Appraising the quality of the studies

All articles within the sample were assessed in terms of their academic quality and rigour. It was noted for each article whether it had been academically peer-reviewed and which journal it had been published in and the journal ranking. This was to ensure that the sample contained quality, scholarly articles that had been published in academic journals. Conference papers were only included if they were published in official international conference proceedings. This ensured the scholarly quality of the articles in the sample pool.

2.5 Extracting the results of each study and synthesising the result.

First, each article was coded according to its theoretical conceptualisation of and approach to health. Second, each article was given a set of secondary codes according to specific broad types/categories of factors, attributes and characteristics identified as necessary for enhancing health in a high-density living environment. This approach enabled a synthesis framework to be developed to consolidate a complex amount of evidence into broad categories directly framed on the first research question so as to form a basic conceptual framework (See Snilsveit et al. (2012: 420) for further information about constructing a framework synthesis approach). Articles were then read again in relation to the second research question with the aim to extracting information, ideas and evidence as to how health evidence can be incorporated into planning strategies. Reading and assessing each article in relation to the second research question revealed that information relating to how health evidence can be incorporated into planning strategies can be broken down into two main categories: 1) suggestions for improving approaches to planning at the bureaucratic level, and 2) specific suggestions for action at the design and implementation level that can be undertaken to enhance healthy higher density living. Each article within each of the conceptual framework categories was therefore given one or two secondary codes: 1) Approaches to Planning at the Bureaucratic Level, and 2) Actions for Design and Implementation, depending on the type of suggestions made within each article.

Articles were given more than one code if the evidence included in pertained to more than one category. As a result, two of the articles (Easthope and Judd 2010, Giles-Corti et al., 2012) have been included more than once in the results section. Easthope and Judd's (ibid) literature review refers to both the Global Health and Socio-Ecological Determinants of Health perspectives. Likewise, Giles-Corti et al., (2012) report also includes information pertaining to both approaches.

The attributes of health associated with each theoretical perspective were compared and contrasted to identify key similarities and differences. To examine the spread the publication sources for each of articles a list was compiled that included the name of each article, the theoretical perspective of health that the article deployed, the name of the journal or other source of publication and the Field of Research names (FoR) for each of the named journals. Both the primary (FoR1) and any secondary (FoR2) Field of Research codes were noted. The FoR1 and FoR2 names were taken from the Excellence in Research Australia 2015 Journal List. The full list of codes for each article is provided in Appendix 4. A full list of articles grouped for each of the three theoretical perspectives is provided in Appendix 5. The suggestions identified within the literature sample for improving existing planning strategies at both the bureaucratic and design and intervention-action level as identified from the literature were compared across each of the three theoretical perspectives of health.

Recommendations and points of action aligning with the aims of the *Healthy Higher Density Living* research project were identified from the findings of the review of the literature for each of the two research questions.

3. What is meant by healthy higher density living?

3.1 Definitions of Healthy Higher Density Living

The term ‘high density’ is often used in the sample literature, but is infrequently defined. Of the 141 articles that were selected for inclusion in the review only one out of 141 provided an explicit definition for ‘healthy higher density living’.

Giles Corti et al. (2014: 36) provided an explicit definition of healthy higher density environments as ‘a net density threshold of 20 dwellings per hectare or a gross density of 18 dwellings per hectare’, on the basis that this is ‘the minimum density required to encourage transport walking’; however, no other study provided a specific definition of what constitutes a healthy higher density environment. Giles Corti et al. (2014: 36) definition of Healthy Higher Density can be expressed as follows:

- *Healthy higher density (which equates to ‘minimum density required to encourage transport walking’) ≥ net density of 20 dwellings per hectare or gross density of 18 dwellings per hectare.*

Whilst a definition of healthy higher density was only provided once, within a cross section of the remaining 141 articles higher density was defined in three principal ways:

- According to a specific spatially-defined and quantified set of criteria (12 of a total of 141)
- Descriptively, qualitatively and in opposition to the general size and the health and social-economic situation that characterises low-density living environments (14 of 141).
- The majority of articles made no specific concrete definition of higher density (116 out of a total of 141).

The remainder of this section discusses the principal ways in which healthy and higher density are defined within the literature, and then concludes by comparing the definitions and our recommendations for future research.

3.1.1 According to a specific spatially defined and quantified set of criteria

In the sample literature, higher density was often (12 out of 141) conceptualised in terms of population density and number of units per area; although, with the exception of Easthope and Judd (2010), Cho et al., (2017) and Haigh et al., (2011), no specific measurements were provided.

Haigh et al., (2011: 10) provides a definition of high density in comparison to other densities drawing on government specifications for density definitions for the Mackay region

in Queensland, Australia. According to this definition, density refers to quantifiable measurement specifics. According to the Mackay criteria, high density refers to 100 or more site dwellings (dwellings per ha), net density of 86 or more (dwellings per ha), an unspecified lot size (based on lots occupied by one dwelling), and consists of medium-rise and high-rise apartments as the typical building form (ibid: 10). Haigh et al., (2011: 10) definition of high density can be presented as follows:

- *High Density = 100 (86 or more net) dwellings per ha + typical built form being medium-rise and high-rise apartments*

Easthope and Judd (2010: 2) define density in simple terms as ‘the number of units (people, dwellings, employees) per unit of land area. This can be expressed as a ratio where the numerator is the population and the denominator an area unit (ibid). However, there is no uniform guidance as to whether streets and pathways should be considered within this calculation (ibid). Easthope and Judd (2010: 2) define high density as over 60 dwellings per hectare and generally in units of five storeys or more:

- *High Density = 60 dwellings per hectare + generally in units of five storeys or more*

They also note that calculating can be challenging because the population density of an area may change, while the dwelling density remains the same, particularly as the number of people living in the same household has changed over time (ibid). Easthope and Judd (ibid) also note that in Australia, researchers often conceptualise density somewhat differently to practitioners and policy makers.

Badland et al (2017: 19) uses the ABS ‘mesh block unit’ as an area within which to calculate density based on ‘dividing the number of residential units by the size of the SA1 and collapsed into quartiles’. Other density measures highlighted by Badland et al., (2017: 22) are the 2006 South Australia Planning Document, which categorises net dwelling density on a spectrum from very low to high with fewer than 17 dwellings per hectare being regarded as very low and more than 67 dwellings per hectare being regarded as high:

- *High Density = 67 dwellings or more per hectare*

3.1.2 Descriptively, qualitatively and in opposition to the general size and health problems associated with low density living

The vast majority (116 out of 141) of the articles in the sample did not provide any specific numerical indicators of density. However, a small number (14 out of 141) discussed high density in general terms as 'high' numbers of people per area and 'high level' buildings (see Shi et al. 2018 and Jowell et al. 2017 for examples).

- *High Density = high numbers of people per area +/or high level buildings in an area*

Usually (8 of 141), reference was made to high density in contrast to low density environments and in terms of 'building up' to avoid health problems associated with urban sprawl, particularly those that result from car dependency and sedentary lifestyles that are viewed as an indirect consequence of low-density living (see Giles-Corti et al., 2014, Redman and Jones 2005, Lofti et al,. 2009). In these articles, high density was presented as the antithesis to the health problems associated with living in low-density environments:

- *Healthy high density = minimum density required to encourage active transport/ walking to avoid car dependency and sedentary lifestyles*

For example, Feng et al., (2010) defines density as a measure of the amount of activity found within an area that can be defined in terms of population, housing unit, or employment density; however, they use the term 'high density' to mean anything higher than low density and note that there is no consensus on how the term should be used. Haigh et al., (2011) also uses the term to document anything above low density on a collective basis, without indicating any specific numerical detail.

- *High density = opposite to low density*

Giles-Corti et al., (2016) refers to density as an aspirational measure for particular healthy outcomes: 'sufficient density' for walking, and 'optimum density' for social contact:

- *High density = aspirational for health outcomes characterised by sufficient space for walking and social contact*

In contrast, however, (6 of 141) of the articles refer to 'high density' descriptively, in terms of built environment aesthetics and as sites of socioeconomic poverty and the production and reproduction of health inequalities and social problems, such as crime. Articles based on studies conducted within the UK (2 out of 141) link high density to high socio-economic poverty, poor health outcomes and distinctive high rise architectural styles, increased hazard risk from fire or accidents, and run-down neighbourhoods:

- *High density = socio-economic poverty, inequality, poor health outcomes, distinctive high-rise architecture, poorly maintained built environments*

This contrasts with the framing of higher density environments as gentrified, healthy sites, characterised by healthy populations in more recent studies of gentrified high-rise environments in the UK and the general presentation of higher density in the Australian and Asian context (4 out of 141):

- *High density = gentrified high rise built environments attractive to healthy young professionals*

However, one study defines density as a site associated with qualitative experiences of sensory overload and increased risk of mental ill health and poor recovery from mental ill-health (Soderstrom et al., 2016). In this study, high density is presented as places associated with an enhancement of the mental health risks identified and associated with urban living:

- *High density = sites of enhanced epitome of risks to mental health associated with urban dwelling + qualitative experiences of sensory overload*

High density is also associated with predictable built environment features in two of the studies. Giles-Corti et al., (2015: 128) draws on Duany et al., (2001) to state that high-density developments have a 'connected grid pattern street networks and a mix of destinations integrated within close proximity of a variety of residential dwelling types'.

3.1.3 Comparison of the definitions

With the exception of Giles Corti et al., (2014) explicit definitions of healthy higher density are not provided in the articles. The majority of the literature reviewed does not define density clearly. However, discussed in the previous sub-sections, the literature provides both qualitative and quantitative descriptors and components that are characteristic of high-density environments and which influence health outcomes. These descriptors relate to numbers of people within a spatially defined area, number of buildings within an area or the size of buildings within an area and the health and socio-economic conditions associated with these environments. Common themes that can be identified from the literature and which are suggestive of the descriptors and characteristics that are often referred to when defining or conceptualising what constitutes a healthy high density living environment:

1. Healthy higher density equates to minimum density required to promote walking/active transport over car dependency, which in turn promotes a reduction in sedentary lifestyles and specific chronic health conditions associated with being sedentary, such as heart disease and Type II diabetes;
2. High density is an environment where the numbers of people and/or number of dwelling units per area is equal to or greater than a defined number, such as 60 dwellings per hectare. However, the exact numbers vary across the different studies;
3. High density is associated with particular built environment characteristics, which may be quantified and measured, such as buildings of five stories and above. However, high density is also associated with certain qualitative characteristics, such as particular architectural styles like brutalism, functionalism and high-tech architecture;
4. Higher density living is viewed as representative of the epitome or enhanced form of urban living, where the positive and negative outcomes associated with urban living are amplified;
5. Healthy high density places in redeveloped or 'gentrified' urban areas in South Asia and Australia present the image of being characterised by a healthy diverse population that represents the polar opposite to the outcome of the poorly planned and maintained high density urban tower blocks of the 1960s and 1970s and the poverty, inequality and poor social outcomes that these high density 'estates' continue to represent in particular geographic contexts, such as the UK and US.

3.2 Recommendations

Given the lack of concrete comprehensive definitions and agreement in the academic literature over what constitutes and characterises a higher density living environment, it can be argued that there is a significant need for this project to:

1. Develop a definition of higher density that aligns the existing quantitative and qualitative descriptors and attributes that the literature associates with higher density urban environments.

This would help to ensure consistency across the different academic disciplines in how high density is defined by both planning and health professionals. This definition should include the following:

A specific measurement of the number of units per area that can provide consistency to what is meant by a higher density environment;

A description of qualitative characteristics that can be used to define a higher density living environment, such as the number of storeys of a high-rise building;

A clear description of the particular forms of urban living associated with this type of living environment;

In addition:

- The definition should specifically capture the relevance of higher density living within a 21st century global context, but should also be appropriate for an Australian context.

Another recommendation is to:

2. Build upon and expand Giles Corti et al.,'s (2014) basic definition of healthy higher density environments by looking beyond the quantifiable markers of space required to promote active living to improve mental and physical health outcomes to the qualitative features that enhance healthy lifestyles in higher density settings.

Furthermore, the attributes identified in the existing literature all appear to focus on human health outcomes in the higher density built environment context, with no consideration being given to how the wider natural environment both influences and is influenced by human activity, including the modification of the built environment. For example, there is no mention of how food accessibility or access to the natural environment feature in relation to definitions of density and ways of thinking about how health relates to high density. Also absent from the existing definitions is how density relates to the health impacts of climate change, population growth and migration, and the importance of the interplay between environmental health and human health. Therefore, there is a need to consider how healthy higher density living environments can be defined in relation to environmental as well as human health. Therefore, other recommendations would be to:

3. Develop the definition of higher density environments so that it specifically includes descriptors of the natural environment health and characteristics of the built environment that are particular to higher density living environments;

4. Compile an evidence-base from the academic literature and relevant government and planning literature to understand how the meaning and relevance of higher density living has changed over time and across different contexts in response to changing demographic trends and public health challenges.

5. Find out from discussions with academics from a wide range of disciplines, including planning, public health and urban studies, and with planning and health professionals from a range of organisations in New

South Wales Australia, what the relevance of higher density living is from the perspective of meeting 21st century global challenges. This will help to identify a clear definitive purpose for higher density built environments within the rubric of health, which will help to provide a definition that is both place-based and health-focused.

3.3 Actions

The following points of action were developed from the list of recommendations:

- Transdisciplinary workshop for defining high density

Organising and undertaking a workshop with academics from a wide range of academic disciplines, including public health, planetary health, urban planning and architecture, human geography and sociology, would likely be a useful and effective way of developing the definition of high density, and healthy higher density living environments. Development of this definition should align different ways of approaching and defining density and health in higher density contexts outlined in the recommendations section above.

As the project is about translating health evidence to planning policy, it is imperative that this workshop also includes professionals in both policy and planning who have experience of working in higher density contexts. In addition, given that the attributes used to define density in the sample show inconsistency across different studies, it is important to consider how taken-for-granted assumptions about what constitutes high density or healthy higher density living environments may have shaped approaches to thinking about high density in planning, which, in turn, may have influenced the outcomes of previous studies, policy and practice in relation to high density development. The workshop should therefore include a discussion of participants' existing understandings and conceptualisations of density and thinking about how different understandings and attributes, including those shown in the literature sample, can help to align perspectives between health and planning and between academic institutions and official government and industry planning organisations.

- Undertake a context study of evidence obtained from government and planning literature

Undertaking a review of government policy and planning literature focused on two higher density case study sites within a specific New South Wales context should elicit information about how higher density and healthy higher density living is currently being defined in the policy and planning literature. This review should incorporate a historical review of documents to examine whether and how ways of defining density have changed over time in relation to particular demographic changes and emerging public health challenges. In addition, the review needs to focus on the documents pertaining to two recent higher density case study sites (Green Square and Victoria Park) to thoroughly explore how higher density living is being defined and discussed by contemporary planning professionals. Specific documents that will be reviewed include relevant press releases, marketing documents and planning document that pertain to the Victoria Park and Green Square higher density developments in New South Wales. This will involve reviewing the City of Sydney and Landcom planning documents.

- Undertake a series of interviews and focus group workshops with planning professions

Interviews and discussions with both public health and planning professionals should provide useful information in terms of how high density has been defined in high density planning developments to date. This is necessary in order to be able to identify differences in how high density has been defined and understood between the different professions and between academics and professionals and policy makers for forming the evidence-base of how density and the concept of health in relation to density have changed over time. Only by acknowledging and appreciating existing understandings will it be possible to identify how existing definitions can be improved upon in the development of future planning policy documents to foster greater consistency between the different institutions involved. 10 interviews with planning professionals with extensive experience working on the development of specific higher density case study sites in New South Wales and two focus group workshops with two groups of professionals who have specific experience within the case study sites should help to elucidate this information.

3.4 Theoretical approaches used to relate health to higher density living

Within the 141 articles, health was related to higher density environments using three principal theoretical approaches. These were:

1. Global, Public and Population Health Centred Approach
2. Socio-Ecological Determinants of Health Based Approach
3. Planetary Health (Relational Socio-Ecological) Focused Approach

The majority (109 out of 141) of the articles conceptualised health within the Socio-Ecological Determinants of Health Framework, with Global, Public and Population Health and Planetary Health accounting for the rest (34 out of 141). Fourteen articles were grouped within the Global, Public and Population Health category and 20 were grouped within the Planetary Health category. This information is shown in Table 2:

Table 2: Each theoretical approach to health and the number of articles within each category

	Theoretical Approach to Health		
Approach	**1**	**2**	**3**
	Global Public and Population Health	Social-Ecological Determinants of Health	Planetary Health (relational ecological approaches health)
Number of Articles	14	109	20

Two of the articles within the sample discuss elements and approaches that fall between more than one of the categories (Easthope and Judd 2010, Giles-Corti et al., 2012). In these instances, they have been included in more than one group.

A full detailed list of which articles have been grouped within each of the categories is located in Appendix 4.

The disparity between the Socio-Ecological Determinants of Health and Planetary Health perspectives (relational socio-ecological approach) might, at least in part, be accounted for by the relative newness of the relational turn. This section of the literature review will first discuss each of three theoretical approaches before concluding with a comparison of the various approaches and providing recommendations for future stages of the project.

3.4.1 The approach to healthy higher density living shared by Global Health, Public Health and Population health

Several articles (14 out of 141) focused on healthy higher density from within Global Health, Public Health and Population Health contexts; all three of these fields of health shared a similar approach to healthy higher density. These articles explored healthy higher density living in terms of improving health outcomes for the wider population and by designing cities and approaches to urban development that maximise human health outcomes and are responsive to 21st century global population health challenges (Easthope and Randolph 2009; Easthope and Judd 2010; Giles-Corti et al., 2012; Grant et al, 2017; Hanlon et al. 2012; Randolph and Holloway 2005). Within these articles, healthy higher density living was characterised by environments that are:

1. Responsive to global and local public health challenges that result from increased urbanisation (Global Challenge Responsive);
2. Promote positive physical health outcomes (Positive Physical Health);
3. Promote positive mental health outcomes (Positive Mental Health);
4. Are designed with long-term population health in mind (Long-term Health);

The articles within this section discussed a wide range of influencing attributes that are key to ensuring each of the four characteristics associated with higher density. A summary of these characteristics and associated attributes is provided in Table 3:

Table 3: Key characteristics of healthy higher density living and the influencing attributes from a Global Health perspective

Global Public and Population Health				
	Key Characteristics			
	1	2	3	4
	Global Challenge Responsive	**Promotes Positive Physical Health**	**Promotes Positive Mental Health**	**Focused on Long-Term Health Outcomes**
Number of Articles that discuss each characteristic (Out of a total of 14)	14	13	5	2
Attributes required to influence/ support each of the key characteristics of healthy higher density living	• Focused on solving public health challenges resulting from increased urbanisation • Improvements to infrastructure and transport provision • Solve problems resulting from changing urban demographic population profile	• Good Air Quality • Adequate Outdoor Space • Pedestrian Friendly Outdoor Spaces • Safety • Adequate indoor space • Low neighbourhood traffic levels • Access to Quality Food	• Good Air Quality • Adequate outdoor space • Pedestrian friendly outdoor spaces • Safety and human interaction • Adequate indoor space • Low neighbourhood traffic levels • Low crime levels	• Action-orientated • Future-orientated

Each of these characteristics are discussed in turn below:

3.4.1.1 Healthy Higher Density Living is responsive to global and local public health challenges that result from increased urbanisation (Challenge Responsive)

All articles (14 out of 14) grouped within the global health category emphasise that urban public health faces increasing challenges from pollution, noise, overcrowding and stress. The relationship between health, housing and density is identified as a pressing concern for public and population health within Canada, Australia, Asia and the United States because 60 and 85 percent of the population now live in cities (Grant et al., 2017: 1). Two studies focus specifically on the need to improve population health outcomes in the megacity context, with a particular focus on Asia, recognising the need for increasingly dense cities to meet the needs of growing urban population in developed countries (Grant et al., 2017; Hanlon et al., 2012: 313). Easthope and Judd (2010: 4) discusses the development of high density living environments in Australia within the context of the challenges posed to public health as a result of the growth of the urban population.

Three studies included in this category focus on how infrastructure and transport provision can enable positive health outcomes associated with lower exposure to traffic pollution, increased walking behaviour and less sedentary lifestyles (Bunker and Holloway 2007; Easthope and Judd 2010, Searle 2007). The challenge, from a population health perspective, is how these positive health outcomes can be maximised through higher density urban development (Easthope and Judd 2010: 4). Bunker and Holloway (2007) and Searle (2007) discuss how urban planners have responded to this challenge by focusing on higher density forms of housing to create more compact cities, which present solutions to the public health problems generated by residential urban growth. In this context, density has been defined as 'building up' rather than 'building out' and is often referred to as urban consolidation in Australia (Easthope and Judd 2010: 4).

Three within this category discuss how higher density development presents the best option for meeting the health needs of an emerging urban demographic population profile. According to Easthope and Judd (2010), at present, a discrepancy exists between emerging household types and the increasing numbers of smaller households and available dwellings. However, another study presents evidence that contests this, arguing that this approach assumes that smaller households will automatically be more likely to choose to live in smaller dwellings (Easthope and Randolph 2008). A third study discusses how residents of higher density properties do not all fit within this assumed demographic in Australia, where this type of housing attracts different and diverse household types, including families with children on a low to moderate incomes (Randolph and Holloway 2005). In addition, a report by Giles-Corti et al., (2012: 22) suggests that without adequate urban planning, population growth has the potential to undermine urban public health.

3.4.1.2. Healthy Higher Density living promotes positive physical health outcomes (Positive Physical Health)

Thirteen out of 14 articles grouped within Global Health category emphasised that healthy higher density environments are associated with the following characteristics:

- Good air quality (Easthope and Judd 2010, Flood 1997, Giles-Corti et al., 2012, Giles-Corti et al., 2016, Grant et al. 2017, Redman and Jones 2005);

- Pedestrian friendly outdoor spaces (Barton 2009, Easthope and Judd 2010, Giles-Corti et al., 2012, Giles-Corti et al., 2016, Grant et al., 2017, Randolph and Holloway 2005, Searle 2007, Wells et al., 2010);
- Access to good quality food (Barton 2009, Easthope and Judd 2010, Giles-Corti et al., 2012, Giles-Corti et al., 2016);
- Low neighbourhood traffic levels (Barton 2009, Bunker and Holloway 2007, Easthope and Judd 2010, Giles-Corti et al., 2012, Giles-Corti et al. 2016, Wells et al., 2010);
- Promotion of safety and human interaction (Easthope and Judd 2010, Easthope and Randolph 2008, Flood 1997, Giles-Corti et al., 2012, Giles-Corti et al. 2016, Grant et al., 2017, Randolph and Holloway 2005, Redman and Jones 2005, Searle 2007, Wells et al., 2010);
- Adequate outdoor space (Barton 2009, Bunker and Holloway 2007, Easthope and Judd 2010, Easthope and Randolph 2008, Hanlon et al., 2012, Giles-Corti et al., 2012, Giles-Corti et al. 2016, Grant et al., 2017, Randolph and Holloway 2005, Searle 2007, Wells et al., 2010);
- Adequate indoor space (Bunker and Holloway 2007, Easthope and Judd 2010, Easthope and Randolph 2008, Giles-Corti et al., 2012, Giles-Corti et al. 2016, Hanlon et al. 2012, Randolph and Holloway 2005, Searle 2007, Wells et al. 2010)

For example, Easthope and Judd (2010: 4) discuss how local councils in Sydney have developed residential development strategies that focus on accommodating more 'compact cities'. This approach is based on assumptions that increasing higher density development will automatically lead to healthier resident populations by maximising physical health through reducing sedentary lifestyles, car use and atmospheric pollution (ibid). Grant et al., (2017) discuss how higher density development needs to prioritise reducing deaths from chronic diseases in the developed world, unlike in the developing world where a major challenge for urban planning and public health is controlling emerging infectious disease outbreaks. Healthy higher density environments can contribute to reducing the leading causes of death in the developed world (e.g. ischaemic heart disease, stroke, lower respiratory infections and chronic obstructive lung disease), which are more commonly associated with urban lifestyles and increasingly sedentary behaviours (Grant et al., ibid). As urban populations continue to expand, this leads to considerable challenges for governments and health institutions to keep up to pace in delivering adequate social and health care services (ibid). Giles-Corti et al., (2016) presents a similar view, explaining that creating and sustaining healthy higher density living conditions is a growing public health challenge. From a global public health perspective, healthy cities and high density developments can improve human health outcomes through prioritising walking, cycling and public transport over motor vehicle travel and by enhancing interaction to reduce incidents of physical ill-health (ibid: 2919). According to Giles-Corti et al., (2016: 2919), one way that health in higher density cities can be measured is in terms of positive physical health outcomes. Healthy higher density cities need to be specifically designed to prioritise lowering the rates of cardiovascular disease from physical inactivity, sedentary behaviours and unhealthy diets (Giles-Corti et al. ibid).

Grant et al., (2017: 1) stress that health problems associated with city living are not evenly distributed across the population and explains that cities are hotspots for high levels of air pollution, noise and heat island effects. City environments can lack green space and support for physical activity (ibid). Drawing upon the example of Barcelona, Spain, where up to 20% of mortality may be premature because of poor urban management and pollution, Grant et al., (2017: 3) argues that healthy cities need to place human health needs at the forefront of city design. Similarly, Barton (2009) argues that healthy dense urban environments need to promote positive physical health to reduce disease and ill-health by ensuring access to quality food and outdoor green and recreational spaces to alleviate the risks that urban lifestyles pose from a public health risk perspective (ibid).

3.4.1.3 Healthy Higher Density living promotes positive mental health outcomes (Positive Mental Health)

Five out of the 14 articles grouped within the population health category also discuss how the following aspects of the built environment help to promote positive mental health outcomes, in addition to physical health outcomes:

- Good air quality (Giles-Corti et al. 2016, Grant et al., 2017);
- Pedestrian friendly outdoor spaces (Barton 2009, Giles-Corti et al. 2016, King 2018);
- Low neighbourhood traffic levels (Barton 2009, Giles-Corti et al. 2016);
- Promotion of safety and human interaction (Giles-Corti et al. 2016, King 2018);
- Adequate outdoor space (Barton 2009, Giles-Corti et al. 2016, Grant et al. 2017, King 2018);
- Adequate indoor space (Easthope and Judd 2010, Giles-Corti et al. 2016, Grant et al. 2017, King 2018).

In addition, one factor was identified as essential for promoting positive mental health outcomes:

- Low crime levels (Easthope and Judd 2010, Giles-Corti et al. 2016, King 2018)

The 'compact cities' approach discussed by Easthope and Judd (2010: 4) suggests that increasing higher density development will not only reduce sedentary lifestyles and improve the physical health of the population, but will improve mental health outcomes by promoting safety, comfort and interaction, which can help to reduce rates of depression, loneliness and anxiety. Similarly, King (2018) stresses the importance of human interaction and indoor and outdoor space for improving mental health outcomes. Giles-Corti et al., (2016: 2919) discusses how reducing physical inactivity, sedentary behaviours and unhealthy diets through high-density development will also help to improve mental health outcomes. Giles-Corti et al., (ibid) also discuss how the specific design of high-density development can help to reduce fear of crime and prolonged noise exposure, both of which contribute to the development of mental ill health.

Grant et al., (2017: 1) state that the air pollution, noise and heat island effects that often characterise dense city environments are also linked to poor mental health outcomes. Barton (2009) argues that healthy dense urban environments need to promote positive mental as well as physical health to reduce mental ill health by ensuring access to outdoor green and recreational spaces and well-designed indoor spaces to alleviate the risks to mental health from public health risk perspective.

3.4.1.4 Healthy Higher Density Living is based on a long-term approach to improving the health of the population (Long-term Health)

Two articles (out of 14) grouped within the Global Health category emphasised that healthy higher density living is based on approaches to urban planning that take a long-term perspective on improving the health of the population. For example, one older study (Flood 1997) identified 46 key indicators that can be used to report on the status of cities for future monitoring of a Global Plan of Action and national action plans for examining the health problems associated with urban living. Writing in the late 1990's, Flood (ibid) discussed how high-density development were already regarded as potential solution for meeting the health challenge posed by increasing expansion of the city population across the globe. Furthermore, Redman and Jones (2005) discuss the relationship between health and high-density in relation to global health challenges, arguing that high-density environments in developed

countries need to be future-orientated in their design. High-density environments need to be designed to address the dramatic increase in life expectancy, chronic disease, crowding, pollution, dense transport systems and urban sprawl (ibid: 513), with the needs of future generations being considered as well as the current generation (ibid: 514). However, Redman and Jones (ibid: 514) also recognise that increased density introduces new health risks in the form of bioterrorism, defined as '[A] new threat that....where Microbes [are] introduced into a city whose citizenry has not been formerly exposed to this disease and hence has not developed natural resistance could lead to its rapid spread throughout the urbanised region.'

3.4.2 Social-Ecological Determinants of Health Approaches to Higher Density Living

By far, the majority (109 out of 141) of the articles within the sample is underpinned by a Social-Ecological Determinants of Health approach to conceptualising human health outcomes within higher density contexts. Within these articles, this approach is described as focusing on the inter-relationship between social and environmental determinants of health and includes factors such as socioeconomic background; cultural background, the built environment and the natural environment, which interact with each other to influence health and quality of life outcomes (see Haigh et al., 2011: 3). Social-Ecological determinants of Health approaches differ from approaches embedded in a Global Health perspective in their emphasis on the interplay between the social and environmental factors in determining human health outcomes. These approaches recognise that health outcomes can be both directly and indirectly determined (Crommelin et al., 2017). These approaches can, but do not always, take a broader approach to defining health in terms of general human wellbeing and healthy living for human wellbeing, rather than focusing specifically on physical and mental health (Buys & Miller 2012).

According to this approach, the urban environment can directly and indirectly influence wellbeing in range of different ways by encouraging behaviour change leading to increased physical exercise and lower sedentary behaviours, and through increasing happiness through built environment aesthetics (Buys & Miller 2012, Udell et al., 2014). This approach recognises that the social and environmental conditions, in which we live, work, learn and play all heavily influence the health we can achieve (Haigh et al., 2011). It focuses on the causes of health problems in our society rather than focusing on treating the effects.

Articles that utilised the Social-Ecological Determinants of Health characterised healthy higher density as environments that have the potential to:

1. Promote 'liveability' to enhance human wellbeing (Healthy living as a part of enhancing overall quality of life outcomes) (30 out of 109);
2. Promote positive physical health outcomes that involve prevention as well as mitigation of chronic disease impacts through a 'pathway' approach to enhancing health outcomes (Positive Physical Health) (43 out of 109);
3. Promote positive mental health outcomes through both preventative and mitigation approaches to improving human health (Positive Mental Health) (12 out of 109);
4. Be designed to reduce inequalities in human health outcomes (Health Equity) (48 out of 109)

The different articles within this category emphasise a number of attributes that influence each of these above characteristics. Summary of these characteristics and associated attributes are outlined in Table 4:

Table 4: Key characteristics of healthy higher density living and the influencing attributes from a Socio-Ecological Determinants of Health perspective

Socio-Ecological Determinants of Health				
	Key Characteristics			
	1	**2**	**3**	**4**
	Liveability	**Positive Physical Health**	**Positive Mental Health**	**Health Equity**
Number of Articles that discuss each characteristic (Out of a total of 109)	30	43	12	48
Attributes required to influence/support each of the key characteristics of healthy higher density living	**a.** Promotion of Liveability and Quality of Life rather than Disease Prevention **b.** Uses Stimulating Design and Infrastructure to enhance Resident Wellbeing **c.** Promotes Human Happiness **d.** Emphasises a Two-Directional Relationship between the Built Environment and Human Wellbeing **e.** Promotion of active transport **f.** Enhances Social Interaction, including at different stages of the life course	**a.** Provides access to public and active transport **b.** Building Design and Access to space promotes positive behaviour change **c.** Enables access to fresh food **d.** Limits exposure to air pollution **e.** Promotes thermal comfort and reduces heat-related illness	**a.** Decreases Social Isolation **b.** Limits noise pollution and other environmental stressors **c.** Reduces Crime and Fear of Crime **d.** Reduces Fear of the health risks associated with Environmental Hazards through appropriate Building Design **e.** Decreases Suicide Rates through Effective Building Design	**a.** Age and Health **b.** Gender and Health **c.** Socio-Cultural Factors and Health Behaviours **d.** Socio-Economic Inequalities and Health

Each of these characteristics are discussed in turn in the sub-sections below:

3.4.2.1 Healthy Higher Density Environments promote 'liveability' to enhance human wellbeing (Healthy living as a part of enhancing overall quality of life outcomes)

A number (30 out of 109) of studies that adopt a social-ecological determinants of health approach conceptualise human health in higher density environments in terms of 'Living Well', according to notions of "Liveability' for enhancing quality of life outcome (Easthope and Judd 2010: 10). These studies focus on the lived experience of residents in higher density properties at the level of the building or development, particularly in regards to how this affects resident satisfaction (ibid: 10).

a. Promotion of Liveability and Quality of Life rather than Disease Prevention as an end in itself (Easthope and Judd 2010, Forster 2006, Lofti and Koohsari 2009, Raman 2010)

Rather than focusing directly on epidemiology statistics to measure physical and mental health outcomes, the 30 studies focusing on liveability aim to assess and measure broader quality of life impacts that, in turn, influence physical and mental health outcomes. For example, 3 of these studies specifically discuss how reducing stress levels, risk of chronic diseases, security concerns and crime levels, in addition to promoting activity and social engagement are seen as essential for positively influencing quality of life (Easthope and Judd 2010, Forster 2006, Raman 2010). Two of these three articles focus on human wellbeing and acknowledge how density affects quality of life for the community as a whole, as well as for individual residents (Easthope and Judd 2010: 18, Raman 2010). Another article (Lofti and Koohsari 2009) examined the factors that have been shown to influence higher density residents' quality of life and resident satisfaction, by exploring resident diversity, neighbourhood relations and neighbourhood design as social and environmental features considered necessary for promoting healthy human environments. This approach to human health contrasts with traditional-medical models of health by providing a broader definition of health that includes objective and subjective interpretations and measurements of quality of life (ibid).

b. Uses Stimulating Design and Infrastructure to enhance Resident Wellbeing (Anderson 2009, Duff 2012, Fitzgerald et al., 2016)

Three of the 30 articles focusing on liveability stress the role of density as a situational composition and an affective atmosphere influencer (Anderson 2009, Duff 2012, Fitzgerald et al., 2016). Focusing on the relationship between density and first-hand experiences of mental ill-health, Duff (2012: 367) argues that, 'rather than a fixed substance, the city is approached as a flow of experiences in which patients encounter elements that are assembled in various ways depending on how they see and practice 'the urban''. In other words, liveability looks at the importance of place making for influencing quality of life, rather than the places themselves (ibid). Therefore, liveability approaches to healthy higher density focus on optimising ways of living in higher density environments rather than merely reducing chronic disease incidences.

c. Promotes Human Happiness as an essential feature of liveability (Buts and Miller 2012, Giles-Corti et al., 2014, Kent 2017).

A further three articles within the sample (out of 30) emphasise how healthy higher density environments feature the promotion of positive health-related social behaviours through selective design (Buys and Miller

2012, Giles-Corti et al., 2014, Kent 2017). For example, Giles-Corti et al., (2014), defines liveable environments as 'creat[ing] conditions to optimise health and wellbeing outcomes in residents by influencing various social determinants of health – such as neighbourhood walkability, access to public transport, public open space, local amenities, and social and community facilities.' Giles-Corti et al., (2014) also describes how The National Liveability Study, funded through the Australian Prevention Partnership centre, aimed to develop and validate a set of spatially derived built environment liveability indicators that impact upon non-communicable disease risk behaviours and health outcomes in highly populated city environments. Similarly, Buys and Miller (2012) examine the predictors of residential satisfaction in inner urban higher density environment surveying 636 residents in Brisbane, Australia, about the importance of dwelling design and neighbourhood for living well. They identified that the following specific features of the neighbourhood and dwelling to be critical in predicting residential satisfaction: satisfaction with dwelling position, design and facilities, noise, walkability, safety and condition of local area, and distance from social contacts in the neighbourhood. In addition, Kent (2017) examines how both the built and perceived environment feature together in influencing human happiness.

d. Emphasises a Two-Directional Relationship between the Built Environment and Human Wellbeing (Badland et al., 2013, 2015, 2017a, 2017b, Dodson 2010, Haarhoff et al., 2016, McCrea and Walters 2012, Newman and Kenworthy 1996, Quastel et al., 2012).

Nine of 30 articles highlight the significance of the relationship between the built environment and human health outcomes.

Four of the 30 studies explore the notion of liveability as a two-directional relationship between society and environment (Badland et al., 2013, Badland et al., 2015, Badland et al. 2017). Badland et al., (2017) presents an overview of the Victorian Liveability Research Program, which focuses on conceptualising and creating liveability indicators for higher density neighbourhood environments. They define the following neighbourhood attributes as key liveability indicators: healthy and accessible food environment, affordable, attractive and well-designed housing with optimal light, humidity and temperature control, supportive social infrastructure, transport and walkability (Badland et al., 2017). Liveable higher density communities also need to be safe, attractive, socially cohesive, inclusive, environmentally and economically sustainable, with affordable and diverse housing linked via public transport (Badland et al., 2017). Another article discusses how healthy cities should also be characterised by high numbers of residents walking and cycling to employment, having access to educational opportunities, public open space, local shops, health and community services and having access to a variety of diverse leisure and cultural opportunities (Badland et al. 2015). This article also stresses the importance of housing diversity for enhancing liveability, exploring how diversity affects housing choice and density, which in turn, underpins each walkable community (Badland et al., 2015: 31). This same article also discusses how living in poor quality housing is associated with poorer physical and mental health outcomes, highlighting how the relationship between health and housing is a two-way interactional relationship (Badland et al. 2015). This is because physical and mental health status influences the type of housing one can afford; conversely, housing affordability influences mental health outcomes (Badland et al., 2015: 18). Approaches to enhancing liveability, therefore recognise that health outcomes and health-influencing behaviours are not spread evenly across the population, but linked to socio-economic, family and gender status (Badland et al., 2015: 18).

Five of the 30 articles focusing on the theme of liveability explore the significance of the relationship between health and place through the discussion of specific case studies. For example, Haarhoff et al., (2016) explores the relationship between health and place in contexts of different densities by examining the findings from case studies of residents in medium density housing in Auckland to examine the extent to which liveability is being enhanced in intensified suburban contexts. The case study findings are then considered in relation to urban consolidation and higher density living (ibid). Larger cities in Australia and New Zealand have urban consolidation policies promoting higher density development, justified on the grounds of enhancing urban sustainability. One article examines how higher density cities are more transport fuel efficient than lower densities (Newman and Kenworthy 1996). Three articles focusing on liveability discuss how higher density development makes public transport more economically viable and potentially reduces private car dependency and atmospheric pollution, leading to more sustainable and resilient urban lifestyles (Dodson 2010, McCrea and Walters 2012, Quastel et al., 2012).

e. Promotes positive health outcomes through the promotion of active transport (Falconer and Richardson 2010, Yang 2008)

Two of the 30 articles specifically focus on the significance of active transport for health in high-density urban cities. Falconer and Richardson (2010) explore how active transport in high-density developments promotes positive health outcomes. Yang (2008) stresses the importance of active transport for improving the quality of life for residents and defines healthy, socially sustainable, urban cities as green, vibrant, more compact, walkable, accessible, which foster a unique sense of place.

f. Enhances Social Interaction, including at different stages of the life course (Diener & Suh, 1997, Giles-Corti et al., 2012, Howley et al., 2009, Kaźmierczak 2013, Lusher et al., 2008, Marans & Couper, 2000; McCrea & Walters, 2012; Pacione, 2003, Raman 2010, van Kamp et al., 2003, Yang 2008, Yung et al., 2017)

Thirteen of the 30 articles discuss how liveable environments should enhance social interaction to improve human wellbeing.

Four of these articles argue that liveable higher density environments should enable residents to live closer to family, friends, to access goods and services as well as have access to reliable public transport (Howley et al. 2009, Lusher et al. 2008, Yang 2008). For example, Lusher et al.'s (2008) case study of designing liveable streets in New York City highlights how liveable streets in higher-density environments are underpinned by consideration for the wide needs of all users and good planning to dedicate increasing amounts of space to pedestrians, cyclists and public transport to promote quality of life. Haarhoff et al. (2016), draws on The Victorian Government's 'Activity Centre Toolkit' for promoting higher density, transit orientated development in Melbourne and Auckland's 'Auckland Plan' for creating the world's most liveable higher density city, to argue that neighbourhoods need to offer opportunities that are both health stimulating and aesthetically pleasing to enhance social cohesion and interaction and to enable people of all demographic groups to mix in cafes, restaurants, shops, services and public parks. Greater satisfaction in higher density housing in Vancouver is associated with enhancing quality of life through social interaction via

amenity and services provision, and by greater involvement of citizens in urban planning at the local level (Haarhoff et al. 2016). This suggests that the place shaping process itself is important for enhancing liveability.

Seven of the 30 articles focusing on liveability in higher density environments focus on the experiences and perceptions of the residents to draw attention to the importance of a residential environment that enables people to experience personal fulfilment and to attain their life goals (Diener & Suh, 1997, Marans & Couper, 2000; McCrea & Walters, 2012; Pacione, 2003, Raman 2010, van Kamp et al., 2003, Yang, 2008).

Three articles specifically focus on the importance of enhancing liveability in higher density environments across the different stages of the human life course (Giles-Corti et al., 2012, Kaźmierczak 2013, Yung et al., 2017). Yung et al., (2017) highlights how the elderly often spend a considerable amount of time in public parks, drawing attention to how the social dimension of environments have a significant influence on the health and wellbeing of elderly people. Similarly, Giles-Corti et al., (2012: 14) also recognises the importance of public parks for enhancing liveability of higher density environments for older people. Interaction can be promoted through the design of space and by creating opportunities for participation in the general planning and design in local parks to contribute to healthy aging and to prevent and delay the onset of chronic disease, cognitive decline and mental ill health (Giles-Corti et al. 2012: 14). Parks should therefore enable elderly residents to socialise with friends, meet new friends and maintain a strong sense of connection. Open spaces should be within a short distance of nearby residents (ibid). Kaźmierczak (2013) focuses specifically on other stages of the life course, in addition to retirement and older age, to argue that spaces should be designed for a variety of simultaneous uses, for instance, to watch grandchildren playing while chatting to neighbours. Links to cultural heritage can provide opportunities for elderly people to share stories with young residents of where they have lived for many years, which can enhance the sense of community and close generational divides between community members (ibid). However, Giles-Corti (2012: 14) also questions whether higher density environments can promote good health outcomes in older residents, arguing that high-rise living is associated with lower levels of satisfaction and a poorer sense of community amongst elderly people.

3.4.2.2 Healthy higher density environments promote positive physical health outcomes that involve prevention as well as mitigation of chronic disease impacts through a 'pathway' approach to enhancing human health (Positive Physical Health)

A number of articles embedded on a socio-ecological determinants of health approach focus specifically on enhancing physical health outcomes (43 out of 109). Specific attributes associated with healthy higher density that can be identified from this sample are each discussed in turn below:

a. Access to public and active transport (Chan and Lee 2008; Evans et al. 2003; Ewing et al. 2007, Ewing et al. 2008, Forsyth et al., 2008, Giles-Corti et al., 2012, Giles-Corti et al. 2014; Giskes and van Lenthe 2011, Gómez-Jacinto and Hombrados-Mendieta 2002, Greenwald and Boarnet 2001, Heath et al. 2006, Leal and Chaix 2011, Moudon and Lee 2003, Song and Knaap 2004, Talen 2006, Yan and Voorhees 2010).

Sixteen out of the 43 articles that focus on physical health benefits of higher density living discuss the significance of access to public and active transport for improving human physical health. These studies focus specifically on reducing cardiovascular and cancer mortality, obesity rates, road traffic mortality and respiratory health through improving access to physical activity. Eleven out of these 16 studies discuss how higher density provides better access to services and facilities and increases proximity, which results in higher walkability, active living and lower obesity rates (Ewing et al. 2007 Forsyth et al. 2008; Giles-Corti et al., 2012, Giskes and van Lenthe (2011); Greenwald and Boarnet 2001; Heath et al. 2006; Leal and Chaix 2011; Moudon and Lee 2003; Song and Knaap 2004; Talen 2006; Yan and Voorhees 2010). Two of these studies specifically advocate for 'high-density', 'high-intensity', 'compact', 'mixed-use' and 'pedestrian-oriented' urban development as the desired strategies for positive health outcomes (Chan and Lee 2008; Ewing et al. 2008).

In contrast, two studies emphasise the negative physical health outcomes associated with high density living, specifically those associated with overcrowding (Evans et al. 2003; Gómez-Jacinto and Hombrados-Mendieta 2002).

Giles-Corti et al.,'s (2012) report suggests that higher residential density is associated with more positive health outcomes than lower density environments because of increased transport walking across all age groups. Similarly, Cowie et al. (2016) argues that higher density developments should promote walking to promote positive physical health outcomes, including reducing obesity rates, mortality and adverse birth outcomes. However, the evidence for this is cross-sectional, so causality cannot actually be determined (ibid).

b. Building Design and Access to space to promote positive behaviour change (Giles-Corti et al., 2014, Kane and Whitehead 2018, Kent 2015, Kent and Thompson 2014, Lowe et al., 2015, Lu and Ye 2017, Paciência & Moreira 2017, Thompson 2013).

Eight out of the 43 articles were framed upon a Social-Ecological Determinants of Health approach that emphasised how urban design can help to promote positive behaviour associated with improving health outcomes. For example, Paciência & Moreira (2017) explain how urban density and land use mix are associated with reduced levels of obesity because high-density areas can support increased levels of physical activity because of creating nearby walkable destinations. However, they acknowledge that the relationship between obesity levels and density is complex, because street intersections and mixed land use, together with low physical activity can increase reliance on highly processed and high fat foods (ibid). Similarly, a study by Kent and Thompson (2014) that discussed how urban design could promote positive health outcomes in higher density areas by promoting behaviours that mitigate physical inactivity. Kent (2015) and Thompson (2013) also discusses how density can influence opportunities for physical activity, which can reduce cardiovascular disease-related deaths. Good cardiovascular health is enabled through access to walkable neighbourhoods, connected streets, quality open spaces and public and active transport. According to Kent (2015), good planning can make these options safe, comfortable and accessible, as grid-like street networks with short blocks can make travel routes more direct. However, this study also acknowledges that good design will not make people more active on its own (Kent 2015). These findings acknowledge that the relationship between humans and urban density for health outcomes is complex.

In contrast, Lu and Ye (2017) examined the association between density, diversity, design

and walking behaviour in China from a survey of walking data and found that land use mix and street connectivity did not significantly relate to walking. They found that population density is only related positively to walking for transport and walking for leisure in the lower range of density, while related negatively to walking for leisure in the higher range of density. This suggests that the association between density and walking behaviour is complex and that density, diversity and design on their own may be insufficient to promote good health outcomes relating to the prevention and treatment of chronic illnesses through promoting walking behaviours. Kane and Whitehead (2018) discuss challenges to the positive health impacts associated with walking and public transport by looking at how increasing density of urban regions has led to increased mobility demands, wherein mobility disruptions can result in dysfunctional cities. They argue that policy makers and planners should consider potential future challenges to achieve a sustainable transport system in practice to promote the positive health impacts associated with walking. Similarly, Lowe et al. (2015) highlights future challenges for health promotion that result from knowledge and evidence of the association between the built environment and chronic disease not being currently translated into urban planning policy and practice in Australia. They argue that the location of shops, services, provision of active and public transport, access to open spaces and recreational opportunities are associated with reductions in chronic disease factors such as physical activity levels. Therefore, they recommend that health promotion practitioners and planners work closely together to ensure the development of healthy future environments, through integrated transport, land use and infrastructure planning. These studies recognise the evolving relationship between the social and built environment for promoting human health in higher density environments over time.

c. Access to fresh food (Giles-Corti et al. 2016, Kent 2015, Kent and Thompson 2014, Lowe et al., 2015)

Four of the 43 articles emphasise the importance of resident access to healthy, fresh food in densely populated urban environments to achieve improvements in human physical health outcomes. For example, Lowe et al., (2015) emphasises that shops should be easy for residents to access safely. The number of fast food premises within a particular area should be carefully limited to help to encourage residents to choose healthy fresh food options (ibid).

d. Designed to limit human exposure to air pollution (Cowie et al., 2016, Giles-Corti et al., 2012, Kane and Whitehead 2018, Kent and Thompson 2014, Lowe et al., 2015).

Five of the 43 articles specifically discuss the importance in urban planning of ensuring that streets are designed to limit human exposure to traffic fumes to help to reduce rates of chronic respiratory illness in residents, such as asthma and chronic bronchitis, and to encourage greater outdoor activity (Cowie et al., 2016, Giles-Corti et al., 2012, Kane and Whitehead 2018, Kent and Thompson 2014, Lowe et al. 2015).

e. Designed to promote thermal comfort and to reduce negative health outcomes that result from exposure to heat (Badland et al., 2017, Buys and Miller 2012, Chan and Liu 2018, Ewing and Rong 2008, Guo et al., 2017, Haigh et al., 2011, Hu et al., 2016, Nicholls et al., 2017, Ormandy and Ezratty 2016, Roulet et al., 2006, Taylor et al., 2016, Vandentorren et al., 2006, Wilson et al., 2008).

Thirteen of the 43 articles discuss the impacts of extreme heat and/or insufficient thermal control (to either heat or cold temperatures) on human health, examining how temperature extremes are linked to increased mortality and a range of negative health outcomes. One of the twelve articles highlights the importance of human behaviour for reducing heat-related mortality and morbidity, such as by increasing fluid intake during heat waves (Nicolls et al., 2017). Twelve out of the thirteen articles examine the importance of the built environment on vulnerability to increased mortality and morbidity as a result of extreme heat. These articles reveal how vulnerability is greater in a higher density built environment because building form in these environments can result in higher indoor and outdoor temperatures than lower density environments (Badland et al., 2017, Buys and Miller 2012, Chan and Liu 2018, Ewing and Rong 2008, Guo et al., 2017, Haigh et al., 2011, Nicholls et al., 2017, Ormandy and Ezratty 2016, Roulet et al., 2006, Taylor et al., 2016, Vandentorren et al., 2006, Wilson et al., 2008). All thirteen articles that examine the relationship between thermal control and health emphasise that temperature has both a direct and indirect relationship on human health outcomes.

3.4.2.3 Healthy higher density environments promote positive mental health outcomes that involve prevention and the mitigation of mental ill health (Positive Mental Health)

Positive mental health is a key feature of healthy higher density housing as evidence suggests that living in higher density housing appears to have a range of potential direct and indirect influences on mental health, influenced through the location, design and construction of higher density housing. Twelve of the 109 articles grouped in the Social-Ecological Determinants of Health category discuss the relationship between mental health and higher density environments.

a. Decreasing Social Isolation through High Density Development (Evans et al., 2003, Feng et al. 2017, Giles-Corti et al., 2012, Gómez-Jacinto and Hombrados-Mendieta 2002, Kane and Whitehead 2018, Kent 2015, Kent and Thompson 2014, Thompson and Paine 2017, Kitahara 2018, Soderstrom et al. 2016, Turner and Wigfield 2017, Vassos et al., 2012).

All 12 of the 109 articles that discuss mental health in relation to higher density in urban environments from a Socio-Ecological Determinants of Health approach focus on the relationship between social interaction and mental health, and the significance of the design of the built environment for influencing mental health outcomes.

Four of these 12 articles emphasise how accessible, well-connected street designs and buildings with quality open spaces can foster social interaction in the course of day-to-day life, which helps to improve resident mental health and reduce rates of depression amongst the population (Giles-Corti et al. 2012, Kane and Whitehead 2018, Kent 2015, Kent and Thompson 2014). In contrast, two of the 12 articles argue that high-density environments are more likely to increase rather than decrease social isolation and overcrowding, leading to poor mental health outcomes (Evans et al. 2003, Gómez-Jacinto and Hombrados-Mendieta 2002).

b. Limit noise pollution and other environmental stressors (Feng et al. 2017, Giles-Corti et al. 2012, Kent 2015, Kitahara 2018).

Six of the 12 articles discuss the relationship between environmental stressors and mental health outcomes in high-density contexts. For example, Giles-Corti et al. (2012: 11) argues that healthy higher density environments should not be crowded or noisy and should

include optimum indoor air quality and light to influence mental health. Noise causes annoyance, which in turn causes stress and poor-quality housing is associated with greater psychological distress (ibid). Healthy higher density environments should therefore be well governed and well maintained to create a functional living environment to ensure that social control is maximised (Giles-Corti et al. 2012: 11). Access to green environments, including vegetated areas such as parks, open spaces and playgrounds are associated with health benefits in a range of cross-sectional studies, including mental health outcomes and factors protective of mental health (ibid: 13). This is important because adults with access to green spaces walk more, and nature can have a restorative value for those living with existing mental health conditions. Similarly, Kent (2015) explains that density can be associated with negative mental health outcomes and can breed stress and social isolation, which can lead to the development of depression and anxiety disorders. To mitigate these risks, healthy high density environments should be well ventilated and insulated and should enable access to public and private open space to prevent isolation and community dislocation as this can erode or prevent the development of healthy aspects of higher-density living, including physical activity (ibid).

Two of these 6 articles that focus on the relationship between environmental stressors and the onset of mental ill-health examine how density in both neighbourhoods and households have been associated with stress, leading to the development of psychosis (Vassos et al., 2012; Soderstrom et al., 2016). Soderstrom et al.,'s (ibid) article focuses on the reasons why high density living is associated with poor mental health outcomes by taking an in-depth, qualitative, experience-based approach to understand the link between density and psychosis to conclude that density is associated with sensory overload, in addition to social isolation. High-density environments therefore require the optimising of routes, pathways and transport modes to enable mental ill-health recovery and prevention (ibid).

c. Reduce Crime and Fear of Crime (Giles-Corti et al., 2012, Kent 2015, Soderstrom et al. 2016)

Three of the 12 articles highlight the link between crime and fear of crime in densely populated urban areas and poor mental health outcomes (Giles-Corti et al., 2012, Kent 2015, Soderstrom et al. 2016). Kent (2015) argues that crime can be reduced through features of environmental design and of the building itself, as well as by promoting cohesive local neighbourhoods, which can improve resident comfort and sense of security, which in turn, can help to lead to positive mental health outcomes.

d. Reduce Fear of Environmental Hazards through Building Design (Turner and Wigfield 2017)

One of the 12 articles, Turner and Wigfield (2017), discusses how risks associated with living in high-rise environments can have a negative impact on mental health, with high-rise living evoking fear from fires, falls and suicide, and fears about the threat of communicable diseases. In earthquake-prone countries, residents of high-rise buildings report increased feelings of loneliness isolation and fear (ibid). Well-designed indoor and outdoor public spaces can help to increase resident perception of safety (ibid).

e. Decrease Suicide Rates through Effective Building Design (Turner and Wigfield 2017)

Turner and Wigfield (2017) also draws on historical suicide statistics from Singapore to suggest that the buildings may have been partly responsible for an increase in suicide rates between 1960 and 1976 by giving people a means of committing suicide and ready access to it (ibid). Healthy higher density environments should therefore be designed to help to safeguard people against the risk of suicide and environmental hazards (ibid).

3.4.2.4 Healthy higher density environments reduce inequalities in human health outcomes (Health Equity)

Forty-eight of the 109 articles grouped within the Socio-Ecological Determinants of Health category focus on the theme of health equity and how the complex interaction between humans and density is dependent on individual determinants and demographic-factors such as gender, age, and socioeconomic resources (Crommelin et al. 2017, Yung (2017), Randolph & Tice (2013), Reid, Lloyd & O'Brien (2017), Thompson & Paine (2017).

a. Age and Health Outcomes in a High Density Context (Chan and Liu 2018, Giles-Corti et al., 2012: 13, He et al., 2014, Nicolls et al., 2017, Powers 2013, Shi 2017, Sherry and Easthope 2016, Taylor et al., 2016, Vandentorren et al., 2006, Villanueva et al., 2016)

Ten of the 48 articles focus on age and inequalities in human health outcomes in high-density contexts. One of these articles (Giles-Corti et al. 2012) that discusses health equity explores how healthy higher density environments can reduce mortality in older adults by ensuring access to green space to halt the development of risk factors for chronic diseases in elderly people by providing restorative activities and the prevention of poor health through providing increased opportunities for recreational walking (Giles-Corti et al. 2012: 7). Four of the 48 articles examine the relationship between age and vulnerability to the health risks associated with heatwaves and extreme cold in higher density environments, emphasising how elderly people and young children are more likely to be at risk of health problems compared to other members of the population (Chan and Liu 2018, Nicholls et al., 2017, Vandentorren et al., 2006, Taylor et al., 2016). Two articles (Kent 2015 and Giles-Corti et al. 2012: 9) mention the relationship between health and higher density for families. According to Giles-Corti (2012: 9), density is associated with higher mortality rates throughout the life course, but suggests that this is due to crowding rather than density per se. Healthy higher density environments should therefore contain a minimum percentage of housing large enough to accommodate families and to provide social support and a sense of community for adult and child residents (ibid). Recreational facilities and cycling infrastructure can help to promote physical activity for the benefit of all family members (ibid: 9).

Six of the 48 articles specifically focus on improving child health outcomes in high-density contexts (Giles-Corti et al., 2012: 13, He et al., 2014, Powers 2013, Shi 2017, Sherry and Easthope 2016, Villanueva et al., 2016). These articles consider how children's health can be enhanced in higher density environments, as density, and living conditions more broadly, can affect child cognitive development, mental health, physical health and behaviour. High-rise living has been associated with behaviour problems, increased rates of obesity and childhood inactivity amongst children due to concerns about safety and traffic and a lack of suitable play spaces. Healthy higher density environments should therefore include play spaces suitable for a range of age groups to promote physical activity as well as to promote positive mental health (2012: 13). Similarly, Shi (2017) explores children's experiences of outdoor play to explore whether children bear the heaviest burden of the negative health

impacts associated with living in high-density environments, by examining children's physical, psychological and social development in a case study in Wuhan, China. Shi (ibid) concludes that healthy environments need to promote good air quality to prevent young children from developing asthma and need to consider the safety risk for children from traffic accidents, falling into water, being harassed by strangers, and being injured, in their design. Another study by He et al. (2014) explored the relationship between neighbourhood environment and children's physical activity in ultra-dense Asian cities in Hong Kong and found that healthy environments were associated with lighting, bridges and tunnels, few cars on roads, fresh air, a stimulating neighbourhood, an aesthetically pleasing environment, low crime level, an absence of noise pollution and a lack of crowding in recreational grounds. A study by Villanueva et al. (2016) found that healthy child development is associated with neighbourhood green spaces. Sherry and Easthope's (2016) article focusing on school availability in higher density developments in Sydney, Australia, highlights the need for schools to be located in or near the sites of higher density neighbourhoods to enable children to walk to school. Powers (2013) discusses the same issue in a case study of a higher density development in Vancouver.

b. Gender and Health Outcomes (Fincher 2004, Foster et al., 2015, Giles-Corti et al., 2012, Reid et al., 2014)

Four articles discuss the relationship between gender and health outcomes in high-density development and suggest ways that existing equalities may be countered through appropriation of the built environment (Fincher 2004, Foster et al., 2015, Giles-Corti et al., 2012, Reid et al., 2017). One of these four articles refers to how high density is associated with decreased cardiovascular mortality and lower cancer mortality for both males and females (Giles-Corti et al., 2012: 8). Another of these articles, Foster et al., (2015), looks at how features of the neighbourhood influence sedentary behaviour in Perth, Australia; concluding that the link between the built environment and sedentary behaviour is stronger for women than men. This case study also highlights that higher density walkable neighbourhoods are most beneficial for females as they provide greater access to community infrastructure, which positively influences physical and mental health (ibid). Healthy higher density environments therefore need to be designed to enhance social interaction and participation to promote healthy outcomes in females. Another article, Reid et al., (2017), draws on feminist theory to argue that vertical high-density city community design is heavily male dominated and reflective of male values and interests. Using a material discursive lens, the article explores women's perceptions of liveability and consumption of space, highlighting how changing demographic and societal trends linked to marriage, family and household composition in South-East Queensland have led to increasing rates of female occupation of high-density developments. They found that the evidence of the poorer quality of life found amongst women was influenced by the materiality of the buildings that created unsafe and inappropriate spaces for children, as well as affecting ability to form social relationships and to socialise (ibid). Similarly, Fincher (2004) found that in Melbourne, women's experiences and needs are still largely ignored, with little attention being paid to how women use, manage and experience space in and around high-rise settings. Apartment design was noted to be particularly detrimental to the quality of life of women with children, with opportunities to engage in social interaction being limited by building design of and a lack of access to green space that created tensions around safety and risk to children. Healthy higher density living environments therefore need to be responsive to women's needs as well as men to promote positive health and quality of life impacts (ibid).

c. Socio-Cultural Factors and Health Behaviours in High Density Contexts (Acioly and Davidson 1996, Allen and Blandy 2004, Gifford 2007, Giles-Corti et al., 2012, Giles-Corti et al. 2014, Gunn et al. 2017, Hancock 2017, Holman et al. 2015, Jabareen 2006, Johnston-Lawrence et al., 2015, Randolph 2006, Seo and Chiu 2014, Zhang and Lawson 2009).

Fourteen out of the 48 articles within the Socio-Ecological Determinants of Health category examine how deeply embedded socio-cultural beliefs and practices can create barriers to promoting positive health outcomes amongst higher density residents. For example, Kent (2015) acknowledges how the social and cultural makeup of the community will affect the capacity of the community to adapt to different ways of living, working and socialising. Vulnerable populations, such as those on low incomes or those with lower levels of educational achievement are acknowledged as being potentially more susceptible to the negative impacts of higher density living (ibid). Seven out of the 14 studies examine how long-held perceptions about higher density living limit the attractiveness of these developments to members of the population. Three of these, Gifford (2007), Randolph (2005), Seo and Chiu (2014), discuss how living in high-density public housing remains associated with the socio-cultural stigma of poverty in western contexts, including in Australia. Gifford (2007) explains that these negative perceptions may relate either to personal characteristics and social relations among residents, or to context, including economic status, cultural background or location within the urban fabric. Another article by Zhang and Lawson (2009) argues that problems attributed to high-rise housing are triggered by the negative experience of density in the past. In addition, an article by Randolph (2006), explains that in Australia, high-density housing is still often viewed as a temporary and unappealing housing option for families and explains that concerns about pollution, traffic, lack of social cohesion and community integration place significant limitations on health promoting behaviours.

While these articles all focus specifically on public high-density housing, one of these (Randolph 2006), and three other articles (Allen and Blandy 2004, Holman et al. 2015, Jabareen 2006) include a focus on new, private high-density developments. Holman et al. (2015) explains that there are negative perceptions of new, privately developed high-density developments regarding suspicions about their capacity to deliver a positive impact to society, which they argue stem from concerns about the ability of neoliberal economic planning to deliver benefits to enable all members of society to flourish. Allen and Blandy's (2004) case study in Manchester, UK, found that healthy agers and members of the LGBT community were more attracted to high-density city living than others. In contrast, resistance to high density was found to be strongest in families with young children and in those of retirement age (ibid). Jabareen (2006) suggests however that negative perceptions can be challenged through planning design that promotes housing suitable for mixed communities that promote population diversity. Attracting more interest in higher density living will enable greater numbers of people to benefit from the positive health impacts that are associated with well-designed higher density living environments (ibid). In Australia, this means challenging cultural values that prefer lower density by improving the attractiveness of high-density living (Randolph 2006).

Four articles mention how education can help to challenge embedded socio-cultural beliefs that inhibit the adoption of healthy behaviours amongst residents in high-density developments (Acioly and Davidson 1996, Giles-Corti et al. 2014, Gunn et al. 2017, Jabareen 2006, Johnston-Lawrence et al., 2015, Randolph 2006). One of these, Giles-Corti et al. (2014) draws on empirical case studies and practice-based studies to emphasise that there is a need for a combination of built environment features and education required to change behaviour to promote physical activity. Similarly, Gunn et al. (2017) argues that areas with high population density, mixed land uses and recreational and business destinations are the most successful for encouraging healthy behaviour, but acknowledges that modifying the built environment only produces modest effects on behaviour change in the absence of education and public health awareness raising. A study of resident involvement in neighbourhood social activities in Detroit, Michigan, USA, concluded that the relationship between neighbourhood environment, resident social engagement in the neighbourhood and physical activity should be explored as a complex interaction rather than a simple linear relationship because the relationship between place and health is complex and multi-levelled (Johnson-Lawrence et al., 2015). Acioly and Davidson 1996 found that the success of high-density development on health varied between countries and cities and was influenced by cultural context. As a result, healthy higher density living needs to involve education that is context specific for promoting positive behaviour change, in addition to improvements in the built environment (ibid, Johnson-Lawrence et al., 2015).

d. Improving Socio-Economic Inequalities in Health Outcomes for Residents through Higher Density Built Environments (Acioly and Davidson 1996, Allen and Blandy 2004, Badland et al., 2013, Badland et al., 2017, Beer and Faulkner 2009, Christian et al., 2017, Costello 2005, Easthope and Judd 2010, Fincher 2004, Gifford 2007, Giles-Corti et al., 2012, Giles-Corti et al. 2014, Gunn et al. 2017, Hancock 2017, Holman et al. 2015, Jabareen 2006, Johnston-Lawrence et al., 2015, Kalcheva et al., 2015, Lloyd and Reid 2013, Nicholls et al., 2017, Ormandy and Ezratty 2016, Randolph 2005, Randolph 2006, Seo 2002, Seo and Chiu 2014, Taylor et al., 2016, Thompson and Paine 2017, Vandentorren et al., 2006, Zhang and Lawson 2009).

Twenty-nine out the 48 articles that focus on health equity from a Socio-Ecological Determinants of Health perspective discussed the relationship between socio-economic inequalities amongst the population in high-density environments. For example, Hancock (2017: 96) argues that healthy cities need to be social justice-orientated to promote social inclusion and health equity. Hancock (ibid) highlights how people living in poverty are less healthy, less educated and are less economically and socially productive and are often excluded from participating in the social, civic and cultural life of their communities compared to wealthier members of society. However, according to Hancock (2017: 96-98) healthy higher density environments can be developed if education and culture can be cultivated in places of encounter and co-existence to improve the life and interactions of people in the communities. Similarly, Easthope and Judd (2010) explain how that although high-rise housing in high socioeconomic areas with good neighbourhood amenities, built-in security, shared facilities, recreational spaces and opportunity for selective interactions may work well for people who can afford to live there, those forced to live in smaller accommodation as a result of financial constraints, are more susceptible to health problems associated with overcrowding. Affordable high-density housing could provide a solution to these problems.

Four articles discuss how the risks of heat related mortality and poor health outcomes as a result of excessive heat or cool temperatures, as well as indoor and outdoor air pollution, are more prevalent amongst residents with low-socio economic status who live in higher density living environments (Nicholls et al., 2017, Ormandy and Ezratty 2016, Taylor et al., 2016, Vandentorren et al., 2006). These articles emphasise that improving the building design and providing residents with access to indoor heating and air conditioning technologies that have both a low-energy and low-financial cost can help to overcome existing health inequities.

Two of the 29 articles emphasise how higher density developments can help to overcome existing health inequalities by providing access to healthy food outlets and amenities. Sharp (2003) argues that high density developments need to ensure access to healthy diet choices to avoid the problems associated with the 1970s tower block estates in the UK where insufficient appreciation for low socio-economic residents' wider needs led to increased sedentary lifestyles, poor diet and poor health outcomes, as well as fear of crime. A Conversation article by Thompson and Paine (2017) discuss how obstacles to health are greater for lower-income groups and that denser cities and high-rise apartment living are seen as the antidote to these problems. This is because when poorer communities are located in areas of lesser amenity due to lower housing costs it exacerbates existing health problems (ibid). Good design and building standards can mitigate health problems associated with overcrowding, specifically sleep deprivation, stress and anxiety, which are risk factors for more complex mental health problems, as well as being implicated in the emergence of poor physical health (ibid). These risk factors are known to disproportionately affect low socio-economic groups (ibid). Thompson and Paine (ibid) also discuss how sleep deprivation is linked to obesity, which can lead to many chronic diseases. Healthy higher density environments should therefore provide quality green open space that are easily accessible to everyone, no matter what their income, to improve health outcomes for all (ibid). The article also stresses how financial limitations affect access to healthy food. However, while high-density living is regarded as healthier than low density living, without supportive infrastructure based on an understanding of specific context and community needs, particularly the socio-demographic profile of residents, this way of living would result in potentially reinforcing and exacerbating health inequalities rather than improve the equality of outcome (ibid).

Fifteen out of the 29 articles that discuss health equity from a Socio-Ecological Determinants of Health Perspective illustrate the importance of promoting social equality through the enhancement of social capital and networks through high density development to overcome health inequalities associated with differences in the socio-economic backgrounds of residents (Badland et al., 2017b, Beer and Faulkner 2009, Bunker et al., 2002, Carmona 2014, Cho et al., 2017, Christian et al., 2017, Costello 2005, Easthope and Judd 2010, Fincher 2004, Kalcheva et al.'s 2015, Komossa 2011, Leccese and McCormick 2000, Lloyd and Reid 2013, Randolph 2005, Seo 2002). Three of these 15 articles discuss how the gentrification of densely populated urban centres through high-density developments has perpetuated existing socioeconomic health inequalities (Costello 2005, Lloyd and Reid 2013, Randolph 2005, Seo 2002). Seo (2002) explains that in England and Wales young

professional people have become over-represented in inner-urban living, because gentrification had led to socially exclusive environments and demographic limitations. Consequently, this form of redevelopment risked enhancing existing unequal health outcomes between rich and poor urban dwellers. Similarly, two other studies also discuss how the new neoliberal high-density development market is designed primarily with the needs of two social groups in mind: young professionals and empty nesters; thus, contributing to health inequity between the urban wealthy and poor (Costello 2005, Lloyd and Reid 2013). In contrast, Randolph (2005) argues that higher density living can be associated with an increased facilitation of social capital in a socioeconomically diverse neighbourhood as it encourages community integration and social inclusion. However, this article also acknowledges that high density developments are often associated with high mobility rates, which can undermine the stability of communities through inhibiting the creation of long-term stable communities (ibid).

Seven of the 29 articles that discuss promoting social equality through the enhancement of social capital and networks through high density development highlight how specific features of the built environment can help to improve neighbourhood population diversity, which in turn, can help to decrease health inequalities amongst different socioeconomic groups (Badland et al., 2017, Beer and Faulkner 2009, Bunker et al. 2002, Burton 2000 in Easthope and Judd 2010: 6, Christian et al., 2017, Easthope and Judd 2010, Lecesse and McCormick 2000 in Easthope and Judd 2010: 16). For example, Leccesse and McCormick (ibid) draws on the New Urbanism approach to planning in the US, stressing how the benefits of mixed use developments and a diverse resident profile create healthy, socially vibrant communities (Leccese and McCormick 2000, in Easthope and Judd 2010: 16). Similarly, Bunker et al. (2002) discusses barriers to the creation of socially mixed, diverse communities in Sydney, highlighting the issue of segmentation between the different apartment submarkets. Badland et al., (2017) conceptually maps and spatially tests area-level measures of housing with selected health and wellbeing outcomes of 7753 adults in Melbourne Australia, specifically examining associations between area-level measures of housing density, tenure and affordability with individual-level measures of neighbourhood safety, community satisfaction and self-rated health. The study found that those living in areas with less affordable housing were more likely to feel unsafe and dissatisfied in the community. Renting also increased the likelihood of reporting poor self-rated health. They conclude that equality of outcomes can be improved if developments are located in accessible neighbourhoods that promote social interactions (ibid). Private ownership of higher density dwellings may also benefit health more than rentals as they yield individual-level social and economic benefits including financial security, self-esteem, social status, while poorer housing is associated with poorer mental health, higher rates of disease, respiratory problems and injuries (ibid).

Four of the articles discuss how promoting equal access to communal spaces can help to overcome existing social hierarchies to help to redistribute the benefits of access to communal spaces (Cho et al., 2017, Carmona, 2014, Komissa, 2011, Kalcheva et al., 2015). For example, Cho et al., 2017 discusses how promoting socialisation and equal access to the positive aspects of high-density living in Japan helped to reduce individualist mindsets and norms associated with social hierarchies that can impede distribution of the benefits of high-density housing amongst those most marginalised. Similarly, Kalcheva et al.'s (2015) explored how high-density living in Manchester, UK, helped to enhance the social and cultural capital of all residents, providing the greatest benefit to those from marginalised backgrounds. This resulted from embedding a focus on socioeconomic diversity into the redevelopment plan (ibid).

However, six articles also question the assumption that close proximity to neighbours can always effectively contribute to a more inclusive social environment (Beer and Faulkner 2009, Burton 2000 in Easthope and Judd 2010: 6, Christian et al., 2017, Cho et al., 2017, Easthope and Judd 2010, Fincher 2004). Easthope and Judd (2010: 6) question the assumption that close proximity to neighbours automatically results in a more inclusive social environment, stressing how living in close proximity to neighbours may lead to increased incidences of neighbourhood disputes and problems. Similarly, Christian et al., (2017) questions the ability of higher density living environments to enhance cognitive development in children from low socioeconomic backgrounds, but acknowledges that although effect of built environment is small, it could have lasting effects on population health over time. Burton (2000, in Easthope and Judd 2010: 6) suggests that urban consolidation efforts in Australia may have an adverse effect on social equity because low-income households may have more financial incentive to live in smaller apartments and be more likely to be exposed to health problems resulting from overcrowding, including increased likelihood of depression and social isolation. Fincher's (2004) article discusses how higher density housing in Australia is often perceived to be associated with increased social problems, due to historical experiences of city high-rise social housing blocks in the 1960s. As a result, there remains a stigma associated with higher density public housing (ibid). Beer and Faulkner (2009) call into question the life cycle approach to housing pathway, with increasing numbers of marital breakdowns, increasing numbers of young adults living with their parents, lower birth rates, and greater likelihood of people choosing to have children later rather than earlier in adulthood, influencing housing choice. As a result, higher density developments need to be better designed to promote healthy behaviours amongst an increasingly diverse population (ibid). Cho et al., (2017) highlights through three case studies that in Singapore, Beijing and Tokyo increasing the diversity of high-rise resident population needs to overcome several challenges associated with intensification before it can effectively improve the quality of health outcomes. They highlight that public space is often particularly contested in high-density urban development, compared to other densities (ibid). Conflicts can occur because of functionality problems that result from a lack of shared space and facilities and resident rivalry over them. The outcomes of these conflicts is determined according to the social standing of resident groups and long-term normalisation of the appropriation of space by one user group, which results in those who are most socially marginalised being less likely to benefit from access to spaces that can promote healthy behaviours (ibid).

3.4.3 Planetary Health Approaches to Healthy Higher Density Living (Relational Ecological Approaches)

A small number (20 out of 141) of studies in the sample utilise a Relational Ecological Approach, also recently called Planetary health, to conceptualise and frame health in discussions of the benefits of higher density living. From this perspective, healthy higher density built environments:

1. Involve a co-benefits approach to environmental design that enhances long-term human health and wellbeing by enhancing environmental health that supports human development (Co-Benefits) (15 out of 20 articles: Barthel et al., 2010, Bellamy et al., 2017, Emmanuel and Steemers 2018, Giridharen et al., 2004, Holmes et al., 2015, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Mirzaei 2015, Ng et al., 2012, Pattanayak and Haines 2017, Perini and Magliocco 2014, Speak et al., 2012, Tan et al., 2016, Watts et al., 2015)
2. Are characterised by a holistic relational approach to planning and development that recognises complexity in human and environmental wellbeing, as well as the interplay between mental and physical human health in determining quality of life (Holistic and Complex) (19 out of 20 articles: Barthel et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Emmanuel and Steemers 2018, Holmes et al., 2015, Jowell et al., 2017, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Lotfabadi 2014, Mirzaei 2015, Ng et al., 2012, Pattanayak and Haines 2017, Perini and Magliocco 2014, Ren et al., 2013, Shi et al., 2018, Speak et al., 2012, Tan et al., 2016, Watts et al., 2015)
3. Address 21st century global health challenges, particularly the long-term health threats posed by anthropogenic climate change (Climate Change Responsive) (18 out of 20 articles: Barthel et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Emmanuel and Steemers 2018, Holmes et al., 2015, Jowell et al., 2017, Kleerekoper et al., 2012, Lee and Braham 2017, Lotfabadi 2014, Mirzaei 2015, Ng et al., 2012, Pattanayak and Haines 2017, Perini and Magliocco 2014, Ren et al., 2013, Shi et al., 2018, Speak 2012, Tan et al., 2016, Watts et al., 2015)
4. Promotes environmental sustainability in the design of the built environment (Environmental Sustainability) (13 out of 20: Emmanuel and Steemers 2018, Giridharen et al., 2004, Jowell et al., 2017, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Lotfabadi 2014, Mirzaei 2015, Ng et al., 2012, Perini and Magliocco 2014, Ren et al., 2013, Shi et al., 2018, Tan et al., 2016).

The articles within this group discuss the different attributes associated with each of the key characteristics. A summary of this is provided in Table 5:

Table 5: Key characteristics of healthy higher density living and the influencing attributes from a Planetary Health perspective

	Planetary Health			
	Key Characteristics			
	1	**2**	**3**	**4**
	Co-benefits approach to human and environmental health	**Holistic approach to human wellbeing**	**Addresses global health challenges, especially climate change**	**Promotes planetary sustainability in built environment design**
Number of Articles that discuss each characteristic (Out of a total of 20)	15	19	18	13
Attributes required to influence/ support each of the key characteristics of healthy higher density living	• Enhancing biodiversity of the natural environment • Promoting long-term food security • Enhancing air quality and reducing atmospheric pollution • Improving water quality • Promoting human and environmental flourishing for long-term quality of life • Reducing the human and environmental impacts of increased planetary heat	• Provides opportunities for accessing and attending to nature • Promotes urban greening • Promotes local food production	• Promotes adaptation to climate change • Promotes mitigation of climate change through reduction in greenhouse gases	• Uses renewable energy • Innovative environmentally-friendly building design • Building design helps to promote long-term planet cooling effects and sustainable energy efficiency

Each of these characteristics and associated attributes are discussed in the following sub-sections:

3.4.3.1 Healthy higher density living is embedded within a co-benefits approach

Fifteen of the studies grouped within the Planetary Health category (out of 10), draw on the principles of planetary health in their focus on the co-benefit relationship, in which design of higher density environments can be used to enhance long-term human health and wellbeing by enhancing the environmental health that supports human development (Barthel et al., 2010, Bellamy et al., 2017, Emmanuel and Steemers 2018, Giridharen et al., 2004, Holmes et al., 2015, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Mirzaei 2015, Ng et al., 2012, Pattanayak and Haines 2017, Perini and Magliocco 2014, Speak et al., 2012, Tan et al., 2016, Watts et al., 2015). All fifteen of these articles recognise that human generated climate change is causing adverse health impacts through multiple direct impacts, such as heat waves, sea level rise, increased storm frequency, and indirect pathways such as food and water insecurity. They also emphasise how planetary health-focused approaches to improving health outcomes and quality of life embrace a deeper understanding of the interconnectedness and co-benefits of human health and wellbeing, and the health of the ecosystem upon which it depends compared to the social-environmental determinants of health and public health approaches. At the root of this approach is a recognition that anthropogenic climate change is posing an unacceptable risk to human and environmental health (Watts et al., 2015). However, by tackling the causes of climate change, future human health outcomes can also be improved (ibid, Pattanayak and Haines 2017). According to this perspective, healthy environments do not just manage the impacts of climate change on health, but are designed to improve environmental health to avoid perpetuating negative health impacts that result from the impacts of climate change processes (Watts et al., 2015).

This co-benefits approach recognises that built environments can promote environmentally healthy low carbon ways of living that benefit the health of the natural environment through the reduction of human generated GHG emissions, which benefits human health in the longer-term (ibid). This approach is also representative of a transition from simple, one-dimensional, cause and effect approaches to the relationship between health and environment to one that recognises the multidimensional feedback loops between human and environmental health (ibid). Nine of these articles (Bellamy et al., 2017, Barthel et al., 2010, Emmanuel and Steemers 2018, Kleerekoper et al., 2012, Pattanayak and Haines 2017, Perini and Magliocco 2014, Speak et al., 2012, Tan et al., 2016, Watts et al., 2015) all specifically discuss how planning for healthy densely populated urban environments should involve an approach that strives to:

i. Enhance biodiversity of natural environment
ii. Promote long-term food security
iii. Enhance air quality and reduce atmospheric pollution levels
iv. Improve water quality
v. Promote human and environmental flourishing for long-term quality of life

For example, Bellamy et al., (2017) argues that healthy higher density developments need to promote long-term environmental health to enhance human wellbeing in both the longer and shorter terms. Drawing on evidence from a case study in a high-rise development area in the city of Edinburgh in Scotland, this article discusses how the inclusion of bees and

hoverflies in local environments delivers health benefits to society by providing opportunities for accessing nature near residents' home and promotes citizen engagement and interest in wildlife gardening, which in turn, improves environmental biodiversity, enhances environmental stewardship, as well as creating a more attractive city to live in (ibid). The study also discusses how residents report greater immediate psychological benefits in areas with high levels of biodiversity and that focusing on enhancing biodiversity and ecosystem services through neighbourhood design helps to ensure sustainable environments for promoting human flourishing and health in the longer term (ibid). This can help to ensure better air and water quality and food security in the future (ibid). Similarly, Barthel et al., (2010) and Speak et al., (2012) discuss how productive urban ecosystems improve the biodiversity of the environment and provide a range of cultural, provisioning and regulating services to society, including supporting urban climate adaptation, community cohesion and food production.

Four of these articles discuss how the design of higher density environments can help to reduce the Urban Heat Island effect. These articles draw upon a co-benefits approach to human and planetary health and show that adaptation of building design can help to reduce energy costs associated with cooling appliances, as well as reduce the human health impacts of extreme heat (Emmanuel and Steemers 2018, Kleerekoper et al., 2012, Perini and Magliocco 2014, Tan et al., 2016).

3.4.3.2 Healthy higher density living is characterised by a holistic, relational approach that recognises complexity in human and environmental wellbeing as well as the interplay between mental and physical human health in determining quality of life (Holistic and Complex)

Nineteen out of the 20 articles grouped within the Planetary Health approach discuss ideas for how social and environmental stability can be enhanced to improve positive human health and quality of life, as well as environmental health.

Four of these articles, emphasise that healthy higher density developments should prioritise opportunities for accessing and attending to nature to provide co-benefits for both human physical and mental health and for environmental health (Barthel et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Speak 2012). For example, Davern et al. (2017) emphasise the importance of green spaces for the development of healthy high-density cities, highlighting the significance of non-human health in urban environments for responding to climate change and for mitigating further climate change processes as part of a wider, holistic, longer-term approach to enhancing human wellbeing. The article discusses how higher density development can place added pressure on green space if not well planned and managed. Presenting a case study of how the South Australian government is leading the way in the design of public green spaces in denser cities by bringing together the multiple actors needed to create positive change (Heart Foundation, Departments of Health and Ageing, Environmental Water and Natural Resources, Office for Recreation and Sport, the South Australian Local Government Association, University of Melbourne and RMIT, and the Office of the Chief Architect) in the development of Plan Melbourne 2017-2015, which includes guidelines for establishing minimum garden spaces in new developments, the article acknowledges that urban heat and climate change pose a challenge to biodiversity, with certain tree species no longer being viable in cities several degrees warmer than they once were (ibid). Suitable alternative species need to be selected to avoid biodiversity loss having adverse consequences for public health, ecology and biodiversity.

Three of the 20 articles discuss the benefits of urban greening (Barthel et al., 2010, Bellamy et al., 2017, Davern et al., 2017), which include lower rates of antidepressant prescriptions in neighbourhoods close to woodlands in the UK, and happier people in areas with more birdlife in the US. Healthy higher density environments therefore should be characterised by incorporation of urban greening and providing access to green space to influence positive physical and mental health, social, cultural, environmental and biodiversity outcomes (Davern et al., 2017). Two of the 20 articles (Bellamy et al., 2017, and Davern et al., 2017) also discuss the benefits of local food production for improving human mental and physical health, as well as environmental health outcomes.

3.4.3.3 Healthy higher density living is responsive to 21st century global health challenges, particularly the long-term health threats posed by anthropogenic climate change (Climate Change Responsive)

Eighteen of the 20 articles grouped within the Planetary Health category emphasise how high urban density development needs to be responsive to the long-term human and environmental health threats posed by anthropogenic climate change. These articles all emphasise how adaptation to climate change through the built environment can help to reduce the risks posed to human health, but also emphasise how improvements in the built environment can also help to mitigate the causes of climate change, as part of a co-benefits approach. In particular, this can help to reduce harm from environmental hazard risks by reducing greenhouse gases, improve the equality of health outcomes across the population, and safeguard both human and environmental health for future generations through adopting a long-term perspective. For example, Jowell et al.'s (2017) commentary argues that studies of megacities, defined as 'rapidly developing urban centres with populations of 10 million or more' (ibid: 176) should move beyond commonly identifying single issues and problems to consider the complex health sequelae of the natural and built environmental landscapes. Emphasising the need to enhance environmental sustainability to support human health, Jowell et al. (ibid) argues that megacities need to not only combat high levels of air pollution and the urban heat island effect, but need to foster reductions in greenhouse gas emissions to limit the causes as well as the effects of atmospheric climate change. Mitigation through cooling systems may help improve conditions for contemporary residents in the short term; however, these systems release greenhouse gases, further exacerbating the heat island effect; thus, contribute to longer-term ill health from heat related stress. Although Jowell et al.'s (2017) study focuses primarily on middle-income countries, its co-benefits approach is relevant and applicable to Western city context given that '20% of the world's megacities will be in high-income countries' by 2030, when more than 'two thirds of the world's population will reside in urban areas (ibid:176). The development of high-density urban centres is argued to present a unique opportunity rather than a challenge for improving life through the creation and development of sustainable natural and social environments (ibid). Eight articles explore possibilities for reducing the Urban Heat Island effect through design of the built environment in cities across the globe, in order

to promote planet cooling, as well as to reduce risks posed to human health by extreme heat (Emmanuel and Steemers 2018, Holmes et al., 2015, Kleerekoper et al., 2012, Lee and Braham 2017, Mirzaei 2015, Ng et al., 2012, Perini and Magliocco 2014, Tan et al., 2016).

3.4.3.4 Healthy higher density living promotes environmental sustainability through its design of the built environment (Environmental Sustainability of Built Environments)

Thirteen of the 20 articles within the Planetary Health group highlight how design of the built environment in higher density contexts can help to promote environmental sustainability (Emmanuel and Steemers 2018, Giridharen et al., 2004, Jowell et al., 2017, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Lotfabadi 2014, Mirzaei 2015, Ng et al., 2012, Perini and Magliocco 2014, Ren et al., 2013, Shi et al., 2018, Tan et al., 2016). Of these, three focus on the benefits of the use of renewable energies in high-rise environments for offsetting the impacts of climate change, arguing that improving the health of the planet requires investment in renewable energy sources as well as ways of reducing energy demands. Tall, high-rise buildings present a great opportunity for sustainable energy development as their height means that they have more potential than other densities to use sustainable sources, such as solar power.

Two out of the 13 articles also illustrate how innovative urban design can influence longer-term human and environmental health in high-density urban contexts (Jowell et al., 2017, Lotfabadi 2014). For example, Loftabadi (2014) acknowledges that tall buildings are also beneficial for environmental health more generally; as tall buildings occupy less land and make better use of daylight and thermal mass therefore cause as little environmental interference as possible.

3.5 Comparing the three theoretical approaches, recommendations and actions

3.5.1 Comparing the similarities and differences between the theoretical approaches

Several key similarities can be identified between each of the three approaches within a higher density living context. Each of the three approaches discuss issues, attributes and factors associated with:

1. Human physical health within higher density contexts
2. Human mental health within higher density contexts

In addition, all three approaches also:

1. Focus on addressing public health challenges associated with 21st century urbanisation
2. Combine reactive and proactive approaches to improving human health outcomes

However, while each of the approaches converge and overlap on these points, subtle differences can be observed between their conceptualisations of and approaches to particular characteristics of health with relevance for higher density urban contexts. A summary of these similarities and differences are captured in Table 6:

Table 6: Comparison of the broad level similarities and more subtle differences between each of the theoretical perspective of health in higher density contexts

	Theoretical Perspectives of Health for High Density Living			
		Global Public and Population Health	**Socio-Ecological Determinants of Health**	**Planetary Health (Relational Ecological Approach)**
Topics and Sub-Topics Discussed in the Full Sample of Articles	**Physical Health**	✓	✓	✓
	Relationship between physical health to the wider concept of human health	✓	✓	✓
	Physical health as a distinct health category	✓	✓	
	Emphasis on Interrelationship with mental health and 'liveability'		✓	
	Holistic conception of human wellbeing in wider context of environmental sustainability			✓
	Relationship and emphasis on the built environment and physical health	✓	✓	✓
	Focus on individual features of built environment and linear relationship	✓		
	Two-directional relationship		✓	
	Significant emphasis on integrated factors		✓	✓
	Active transport	✓	✓	
	Public transport		✓	
	Fresh food	✓	✓	✓
	Thermal comfort		✓	✓
	Co-benefits and holistic, multi-dimensional approach to human and environmental health			✓
	Focus on positive health outcomes	✓	✓	✓
	Reducing epidemiology of chronic disease	✓		
	Emphasis on human agency and behaviour to improve outcomes		✓	
	Promoting human flourishing through environmental flourishing			✓

Theoretical Perspectives of Health for High Density Living

Topics and Sub-Topics Discussed in the Full Sample of Articles	Global Public and Population Health	Socio-Ecological Determinants of Health	Planetary Health (Relational Ecological Approach)
Mental Health	✓	✓	✓
Relationship between mental health to the broader notion of human health	✓	✓	✓
Mental health as a distinct aspect of human health	✓		
Interrelationship to physical health		✓	
Focus on human happiness and quality of life		✓	
Focus on statistics indicating rates of anxiety, depression and other mental health conditions	✓		
Part of holistic conception of human wellbeing in a relational ecological perspective on human and environmental health			✓
Relationship between mental health and the built environment	✓	✓	✓
Focus on individual features of the built environment for reducing rates of specific mental health conditions, i.e. depression	✓		
Focus on reasons why features of the built environment help to promote positive mental health		✓	
Emphasis on perceived versus actual risks for mental health		✓	
Social, cultural, economic, and aesthetic features of the built environment as influencers of mental health		✓	
Urban greening and blueing in a dual approach to enhancing of social and environmental sustainability.			✓

Theoretical Perspectives of Health for High Density Living

Topics and Sub-Topics Discussed in the Full Sample of Articles	Global Public and Population Health	Socio-Ecological Determinants of Health	Planetary Health (Relational Ecological Approach)
Responsive to 21st Century Public Health Challenges Associated with Urbanisation	✓	✓	✓
Addresses health problems associated with urban growth	✓	✓	
Preventing and reducing overcrowding	✓	✓	
Prevention of infectious diseases	✓		
Prevention of chronic diseases	✓	✓	
Responsive to changing urban demographic trends	✓	✓	
Stronger emphasis on health at local level and specific geographic and socio-cultural context		✓	
Greater promotion of health equity and reducing health inequality		✓	
Emphasis on responding to health impacts of anthropogenic climate change			✓
Long-Term Temporal Perspective and Combined Reactive/ Proactive Approach to Improving Health	✓	✓	✓
Action, future-orientated approach	✓	✓	✓
Information campaigns and town-top health governance	✓		
Health education		✓	
Individual and community behaviour		✓	
Focus on far distant future (more than several generations)			✓
Focus on enhancing environmental sustainability for human health improvement			✓

Each of the similarities and differences are discussed in the following sub-sections:

3.5.1.1 Human physical health within higher density contexts – A Comparison between Global Health, Socio-Ecological Dimensions of Health, and Planetary Health.

The three approaches are similar in that they all discuss issues, attributes and factors associated with human physical health. However, there are a number of differences in how each of the three theoretical perspectives conceptualises physical health and approach the issue of physical health in higher density contexts.

- The relationship between physical health within the wider context of human health

The Global Health and the Socio-Ecological Determinants of Health approaches both highlight promoting physical health as a distinct component of a healthy higher density environment. But, for Planetary Health, physical health is not discussed as an individual factor, but rather is embedded within a holistic conceptualisation of human wellbeing that includes physical, mental, spiritual health and quality of life, which taken together, are all regarded integral aspects of human wellbeing (Barthel et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Speak 2012). In addition, although both Global Health and Socio-Ecological Dimensions of Health approaches conceptualise physical health as a distinct entity in itself, the Socio-Ecological Determinants approach places a greater emphasis on acknowledging the interrelationship between human physical and mental health, particularly through the concept of 'liveability', than the articles embedded in a Global Health perspective (see Easthope and Judd 2010, Forster 2006, Lofti and Koohsari 2009, Raman 2010). This is despite the fact that the Global Health perspective identifies the very similar attributes as being key to influencing both positive human physical and mental health.

- The relationship and emphasis on particular attributes of the built environment associated with positive physical health

Another difference between the three approaches in how articles in each conceptual category is the focus and emphasis placed on different attributes of the built environment for improving physical health outcomes. For example, the Global Health perspective articles focus on how the following factors are essential for creating a healthy higher density living environment: good air quality, adequate outdoor space, pedestrian friendly outdoor space, safety, adequate indoor space, low neighbourhood traffic levels, and access to quality food. This approach also emphasises a linear, cause-and-effect relationship between the built environment and its effect on human physical health (for examples see Giles-Corti et al., 2012, Giles-Corti et al., 2016, Grant et al. 2017, Redman and Jones 2005). In contrast, the Socio-Ecological Determinants perspective focuses less directly on the particular individual attributes such as pedestrian friendly outdoor space, adequate indoor space, and safety as factors in themselves, but instead views them in terms of a two-directional approach between the built environment and human health, which is that adequate building design and access to space to promote positive behaviour change that can help to improve human physical health outcomes (see Haarhoff et al., 2016, Kent and Thompson 2014, Kent 2017). This is because this conceptualisation of health places stronger emphasis on creating the conditions through a more integrated approach to the different elements associated with the promotion of physical health through building design (Kent and Thompson ibid). In addition, the Socio-Ecological Determinants of Health perspective thoroughly examines the significance of the provision of public and active transport for improving both human physical and mental health (Falconer and Richardson 2010, Yang 2008).

On the other hand, while the Global Health perspective acknowledges the importance of both the provision of pedestrian friendly outdoor space to improve human physical health and the need to reduce pollution from traffic levels that can lead to respiratory problems (i.e. Grant et al., 2017, the articles in this section of the sample do not fully emphasise the provision of public transport. Both perspectives do however acknowledge the importance of access to fresh food for improving physical human health (Thompson and Paine 2017, Grant et al. 2017). The Planetary Health approach also emphasises the importance of fresh food availability, reducing air pollution and encouraging active transport for improving positive physical health outcomes (Bellamy et al., 2017, Davern et al., 2017). However, this perspective situates the issues of exposure to air pollution, car use and fresh food availability within a wider, multi-directional conceptual notion of a co-benefits and holistic approach to improving human and environmental health (Watts et al. 2015, Bellamy et al., 2017). Unlike the other two perspectives, the Planetary Health approach advocates for the promotion active transport and long-term food security and providing opportunities to promote local food production and active living, such as through urban community agricultural schemes and enhancing opportunities for accessing nature, that promote human flourishing while simultaneously reduces atmospheric greenhouse gases and enhance the biodiversity of the natural environment (Davern et al., 2017).

- The emphasis on positive physical health outcomes in relation to higher density living

All three perspectives focus on improving physical health outcomes. However, there are subtle differences between each in terms of the emphasis placed on particular physical health outcomes, which reflect differences in the theoretical conceptualisation of health. The Global Health perspective places greater emphasis on reducing rates of specific chronic diseases associated with sedentary lifestyles and infectious disease prevention through an epidemiology-dominated approach (see Barton 2009, Bunker and Holloway 2007, Easthope and Judd 2010, Giles-Corti et al., 2012). In contrast, the Socio-Ecological Determinants articles place less emphasis on epidemiological evidence in their discussion of improving physical health. Instead, they place greater emphasis on human behavioural factors, including beliefs, values and choices that influence lifestyles that lead to greater incidences of chronic disease (Kent 2017, Kent and Thompson 2014, Paciência & Moreira 2017, Thompson 2013). Positive outcomes are not only about improving the rates of disease, but about improving the choices that people make that influence the rates of disease and the overall quality of life (Kent and Thompson 2014). For the Planetary Health perspective, improving rates of chronic diseases represent only part of a bigger outcome, which is to promote human flourishing for long-term quality of life by enhancing the condition of the natural environment (Wells et al., 2015).

3.5.1.2 Mental health within higher density contexts – A comparison across approaches

All three approaches are similar concerning their focus on mental health in higher density contexts. However, like with the focus on physical health, there are subtle differences in how each of the three different theoretical perspectives discuss the issue of mental health:

- The relationship between mental health within the wider concept of human health
- The relationship between mental health and the built environment

Like with their approaches to physical health, the articles grouped within each of the three theoretical perspectives differ in terms of how they conceptualise and approach mental health within the wider context of human health and wellbeing. The Global Health approach focuses on mental health as one distinct aspect of human health (Easthope and Judd 2010). The Socio-Ecological Determinants approach also discusses mental health as a distinct aspect of human health; however, like in its approach to physical health, this perspective draws more attention to the interrelationship between human physical and mental health (Feng et al. 2017, Giles-Corti et al. 2012, Kent 2015, Kitahara 2018). It places a much stronger emphasis on the importance of human wellbeing, happiness and of enhancing the quality of life for promoting positive mental health, rather than focusing on the statistics of specific, mental health conditions, such as depression or anxiety rates in higher density living contexts (Haarhoff et al., 2016, Evans et al. 2003, Gómez-Jacinto and Hombrados-Mendieta 2002). The Planetary Health perspective places mental health within a holistic conceptualisation of human wellbeing, consisting of physical, mental, spiritual, economic and cultural wellbeing and human comfort and security, embedded within a wider relational ecological perspective of human and environmental wellbeing (Barthel et al., 2010, Bellamy et al. 2017, Speak 2012).

All three perspectives discuss how various aspects of the built environment are essential for promoting positive mental health outcomes amongst the population in higher density urban contexts. However, articles in the Global Health category (i.e. Barton 2009, Giles-Corti et al. 2016, Grant et al. 2017, King 2018) discuss how individual particular features of the built environment are associated with reduction in the rates of mental health conditions in a more general sense than the Socio-Ecological Determinants perspective which places greater emphasis on the reasons why these same particular features of the built environment lead to improvement in mental health (see Kent and Thompson 2014, Feng et al. 2017, Vassos et al., 2012, Soderstrom et al. 2016). Similarly, while both perspectives emphasise the importance of the built environment for decreasing rates of social isolation, creating inclusive and cohesive communities and enhancing perceptions of safety and comfort, as well as in promoting active lifestyles, the Socio-Ecological Determinants perspective places greater emphasis on the role that fear of crime, fear about the risks associated with environmental hazards, such as fire or earthquakes, as supposed to rates actual rime or accidents in influencing mental health outcomes than the Global Health perspective (Giles-Corti et al., 2012, Kent 2015, Soderstrom et al., 2016). The Socio-Ecological Determinants approach also emphasises how these fears may be reduced through appropriate design of the built environment (Soderstrom et al., 2016, Turner and Wigfield 2017). In addition, this approach is the only one to discuss how suicide rates can be reduced through effective building design (Turner and Wigfield 2017). Also, this approach places greater emphasis on the role that stimulating design, provision of light, planning for leisure and cultural opportunities, temperature control and aesthetic appeal can have for enhancing positive mental health outcomes in higher density contexts than the other two perspectives (Evans et al. 2003, Gómez-Jacinto and Hombrados-Mendieta 2002, Anderson 2009, Duff 2012, Fitzgerald et al., 2016). It also stresses the importance of designing environments to improve the development of local economies for enhancing employment, resident self-esteem and mental health outcomes (Easthope and Judd 2010, Fincher 2004, Hancock 2017, Sharp et al., 2003). In contrast, the Planetary Health perspective places greater emphasis than either of the other two perspectives on the role that enhancing green and blue spaces within higher density contexts has for improving human mental wellbeing, through the enhancement of social and environmental sustainability (Barthel et al., 2010, Bellamy et al., 2017). It also places more emphasis on the need for the urban built environment to design and develop environments that provide opportunities for accessing and attending to nature, than the articles in the Socio-Ecological Determinants and Global Health perspectives (Jowell et al., 2017, Lotfabadi 2014, Ren et al., 2013, Shi et al., 2018).

3.5.1.3 Addressing public health challenges associated with 21st century urbanisation –A comparative analysis

Articles grouped within each of the three conceptual categories are similar to the extent that their discussions of what constitutes a healthy higher density living contexts are framed upon recognition that higher density living contexts need to seek to address existing public health challenges that are associated with 21st century urbanisation. These challenges range from air pollution from traffic fumes, sedentary lifestyles, overcrowding in city centres and health problems associated with the urban heat island effect. However, each of the three conceptual categories contains key differences in terms of the scope and scale of the challenges that they argue that a healthy higher density environment should address. According to the Global Health perspective, healthy higher density environments should involve local solutions that are responsive to global scale challenges to public health (Easthope and Judd 2010, Grant et al., 2017; Hanlon et al., 2012: 313). In particular, they suggest that healthy higher density living environments need to be designed to reduce overcrowding in the cities and the health problems associated with overcrowding and a rapidly increasing urban population, including an increased risk of infectious disease epidemics and problems that result from a changing urban demographic population and increased life expectancy amongst older people living with long-term chronic conditions (Grant et al., 2017; Hanlon et al., 2012: 313).

In contrast, the Socio-Ecological Determinants perspective emphasises the significance of regional and local context to a greater extent and draws greater attention to issues of health inequity in multi-scale contexts and the significance of this challenge to public health (Badland et al., 2017b, Beer and Faulkner 2009, Bunker et al., 2002, Carmona 2014, Cho et al., 2017, Christian et al., 2017, Costello 2005, Easthope and Judd 2010, Fincher 2004, Kalcheva et al.'s 2015, Komossa 2011, Leccese and McCormick 2000, Lloyd and Reid 2013, Randolph 2005, Seo 2002). For example, while they highlight the need to tackle increasing health inequalities resulting from widening socio-economic patterns in the developed world, socio-cultural factors and health behaviours that influence the success of a particular health promotion outcomes will vary depending on the regional and local context in which it is promoted, for example in China or in the US (Badland et al., 2017b,

Beer and Faulkner 2009, Bunker et al. 2002, Burton 2000 in Easthope and Judd 2010: 6, Christian et al., 2017, Cho et al., 2017, Easthope and Judd 2010, Fincher 2004, Lecesse and McCormick 2000 in Easthope and Judd 2010: 16). A number of articles within this group also highlight the need to reduce the health inequities associated with extreme heat and inadequate thermal control (Chan and Liu 2018, Nicholls et al., 2017, Ormandy and Ezratty 2016, Taylor et al., 2016, Vandentorren et al., 2006, Wilson et al., 2008). This perspective also emphasises that the significance of local contexts for address health equity issues relating to health inequalities that result from age and gender differences (Fincher 2004, Foster et al., 2015, Giles-Corti et al., 2012: 13, He et al., 2014, Powers 2013, Reid et al., 2017, Shi 2017, Sherry and Easthope 2016, Villanueva et al., 2016).

The Planetary Health perspective differs from the other perspectives in that its primary focus is addressing global health challenges that are associated with anthropogenic climate change and associated natural environmental degradation (Bellamy et al., 2017, Holmes et al., 2015, Jowell et al., 2017, Kleerekoper et al., 2012, Ng et al., 2012, Perini and Magliocco 2014, Watts et al., 2015). This approach acknowledges the different scale of the challenges that result from climate change, from increasing number of climate refugees at the global scale to the effects of increasing air temperatures in individual local contexts (Jowell et al., ibid, Watts et al., ibid).

3.5.1.4 Combined reactive and proactive long-term approaches to improving human health outcomes – Similarities and differences between perspectives

The three theoretical approaches to health all highlight that improving urban public health through higher density development requires taking a combined reactive and proactive long-term approach that provide a remedy for reducing existing health problems associated with urban living and preventing the development of these conditions amongst future generations, as well as tackling new emerging health problems, such as changes in air quality in recent decades as a result of increasing global temperatures. However, the perspectives differ in terms of the focus and temporality of their long-term dual approach to tackling these challenges. For example, the Global Health perspective emphasise the need for focus on the long-term health outcomes through taking an action, future-orientated approach that draws on lessons learnt to plan for emerging global health challenges as a result of increased urbanisation (Grant et al., 2017, Hanlon et al., 2012, Easthope and Randolph 2008, Randolph and Holloway 2005). This perspective places significant emphasis on the need for public health information campaigns and top-down governance and decision-making in planning for health improvement (Grant et al., ibid, Hanlon et al., 2012, Flood 1997).

In contrast, the Socio-Ecological perspective places more emphasis on solving problems associated with sedentary lifestyles and the health problems that characterise lower density environments through higher density development and taking preventative approach to tackling the emergence of these problems amongst future generations by placing more emphasis on education and the role of individual and community health behaviours and changing the embedded

socio-cultural beliefs and norms that influence existing problematic health outcomes (Acioly and Davidson 1996, Giles-Corti et al. 2014, Gunn et al. 2017, Jabareen 2006, Johnston-Lawrence et al., 2015, Randolph 2006). The Planetary Health perspective differs significantly with regards to the extent of its long-term temporal perspective in approaching the task of improving health outcomes, as it seeks to enhance planetary sustainability upon which human health depends for the more distant future (Watts et al., 2015). Although it emphasises a reactive approach to existing health problems associated with the effects of climate change, it places a particularly strong emphasis on the need for prevention of future health problems through climate change mitigation efforts (Jowell et al. 2017, Bellamy et al., 2017, Barthel et al., 2010, Holmes et al., 2015, Kleerekoper et al., 2012, Pattanayak and Haines 2017, Speak et al., 2012) Consequently, the Planetary Health perspective places greater significance on the need for healthy higher density living environments to involve environmentally friendly and sustainable design and at the heart of this approach is an identified need to improve the health of the environment to achieve the any improvement in human health outcomes in the long term (Jowell et al., 2017, Lotfabadi 2014, Ren et al., 2013, Shi et al., 2018). In particular, the Planetary Health approach highlights the importance of building design in reducing the Urban Health Island effect in ways that promote planetary cooling as well as to mitigate the human health risks associated with extreme heat in higher density urban contexts (Emmanuel and Steemers 2018, Holmes et al., 2015, Kleerekoper et al., 2012, Lee and Braham 2017, Mirzaei 2015, Ng et al., 2012, Perini and Magliocco 2014, Tan et al., 2016).

3.5.2: Comparing the utilisation of the three theoretical approaches to health across the different academic disciplines

The spread of the academic journals that the articles within the samples were published in provides a guide as to how each of the three theoretical perspectives of health have been utilised across the different academic disciplines, for example, whether and how often they have been utilised by the Geography, Urban Planning and Public Health disciplines. Comparison of the 2015 Excellence in Research Australia (ERA), Field of Research 1 names (FoR 1) for articles grouped within each theoretical perspective indicates disciplinary utilisation of the perspectives (see Methodology section for an explanation of the ERA FoR categorisations).

Table 7 provides a summary of the findings:

Table 7: Number of articles framed using each of the identified theoretical focus on health for high density living and the journal subject focus that the articles in each category were included within:

Theoretical Framing of Health for High-Density Living			
	Theoretical Perspective		
	Global, Public and Population Health	Socio-Ecological Determinants of Health	Planetary Health (Relational Socio-Ecological Approach to Health)
	Number of Articles		
Academic Journals	**Total number of articles**	**Total number of articles**	**Total number of articles**
	14	**109**	**20**
Academic Journal Disciplinary Composition (ERA 2015 FoR 1 Name)			
Multidisciplinary	14	10	2
Urban and Regional Planning	7	32	1
Medicine and Health Sciences	1	7	2
Public Health and Health Services	1	12	1
Environmental Science	1	2	3
Environmental Engineering	0	0	1
Chemical Sciences	0	0	1
Architectural	0	5	2
Cultural Studies	0	1	0
Human Geography	0	2	0
Design and Management Studies	0	1	1
Sociology	0	5	0

Theoretical Framing of Health for High-Density Living				
		Theoretical Perspective		
		Global, Public and Population Health	Socio-Ecological Determinants of Health	Planetary Health (Relational Socio-Ecological Approach to Health)
		Number of Articles		
Academic Journals		Total number of articles 14	Total number of articles 109	Total number of articles 20
Academic Journal Disciplinary Composition (ERA 2015 FoR 1 Name)	Paediatrics	0	1	0
	Psychology	0	1	0
	Civil Engineering	0	1	0
	Engineering (General)	0	8	3
	Sports Science	0	2	0
	Other Studies in Human Society Journals	0	2	0
	Forestry Science	0	0	1
	Unclassified/ unclassifiable Items	1	17	2

The table shows that each of the three theoretical perspectives of health are utilised within a wide range of journals, including journals defined as multidisciplinary. The majority of both the Global Health (7 out of 14) and Socio-Ecological Determinants of Health (32 out of 109) perspectives most often appear in journals located within Urban and Regional Planning. On the other hand, the Planetary Health perspective is used across a broader range, including in published outputs that were unclassified within the ERA in 2015. Two out of the 20 Planetary Health articles were located in Medicine and Health Science journals. Two were located in a multidisciplinary journal, 1 in Urban and Regional Planning, 1 in Public Health, 3 in Environmental Science, 1 in Chemical Science, 1 in Environmental Engineering, and 1 in Design and Management Studies. Two were located in the Architecture journals and three were located in the general Engineering journals. Two articles could not be classified according to the 2015 ERA. This wide spread of utilisation of the Planetary Health concept is likely to be reflective of the strong inter-disciplinary approach that Planetary Health encapsulates. The fact that two items could not be classified by the 2015 ERA reflects the fact that it is an emerging concept and has been utilised in a new journal that has been established since 2015, and in The Conversation, which falls outwith the classificatory scope of the ERA.

The Global Health perspective is most commonly used in the urban planning journals (7 out of 14). This suggests that a number of studies in planning are continuing to use a population and epidemiology-focused definition of health that pays less attention to the role of the built environment in influencing health than might be expected from a discipline that is centred on the built environment (32 out of 109). Other journal disciplines that utilised the Global Health concept include Medicine and Health Sciences (1 out of 14), Public Health and Health Services (1 out of 14), Environmental Science (1 out of 14), and the Multidisciplinary Journals (3 out of 14). One item, an independent academic report, could not be classified by the 2015 ERA.

In contrast, the large number of planning articles utilising the Socio-Ecological Determinants perspective is more in line with expectation given the planning disciplines focus on the built environment. Other journal disciplines utilising the Socio-Ecological Determinants perspective range include: Multidisciplinary (10 out of 109, Public Health and Health Services (12 out of 109), Medicine and Health (7 out of 109), Sociology (5 out of 109), Engineering (8 out of 109) and Architecture (5 out of 109). In addition, this definition also appears in the Environmental Science, Cultural Studies, Psychology, Civil Engineering, Human Geography, Design and Management Studies, Sports Science, Forestry Science, Paediatric Studies, and other studies in Human Sciences. This reflects the wide range of disciplines that this concept draws upon, for example, the socio-cultural factors and built environment factors that influence health. Most significantly, it also highlights how this definition is commonly used by both health scientists and by planning scientists. A significantly large number of items within this theoretical grouping are published items that are not classified by the 2015 ERA (17 out of 109). This reflects that this approach includes several academic reports and literature reviews published by independent sources (5 out of 109), in addition to several articles that appeared in The Conversation (4 out of 109), which does not fall under the EMA classification.

What is most significant for the purpose of the Healthy Higher Density Living research project is that neither the health nor planning academic disciplines are restricted to using one particular theoretical conceptualisation of health. Instead, both the planning and health disciplines appear to utilise all three conceptualisations in different articles published within each discipline's academic journals. While this represents an openness of each of the academic disciplines to draw upon different theoretical approaches, it also indicates inconsistency in how the different disciplines actually draw upon and utilise each of the different theoretical perspectives.

3.6 Recommendations

Given the existing differences between the different approaches to health, the following recommendations can be made for the HHD project to:

1. Create a standard definition of health that unifies and aligns the priorities of each of the three approaches to health. This definition should:

- Seek to align the different conceptualisations of mental health, physical health, environmental health, quality of life and wellbeing to ensure that the definition of health encompasses the insights provided by the three different approaches to health;

2. Create a definition of a healthy higher density environment that draws on the different perspectives to identify characteristics associated with healthy higher density living, such as access to green space, transport links and mixed land use;

3. Develop a conceptual framework of health that illustrates all the different attributes associated with health suggested by each of the different perspectives and the interactions between the different factors. This should involve:

- Identifying how the different characteristics and attributes outlined in the literature associated with health outcomes in higher density context fit within the conceptual framework;
- Mapping the interactions between factors for different case study sites to develop a co-benefits framework that identifies the relationship between factors that influence health and the co-benefits between the social and environmental influencers of health to provide a visual representation of the relationship between health and place;
- Working with researchers from a broad range of academic disciplines and in partnership with health and planning professionals to develop and refine the framework as part of a transdisciplinary co-learning activity;
- Focusing on identifying the particular contemporary health challenges that higher density living relates to within the conceptual framework; for example, climate change, gendered health inequality, environmental degradation, urban population growth, and changing demographic profile.

4. Develop a methodology for identifying the different factors and attributes associated with enhancing health outcomes, and for measuring health outcomes and the subjective as well as objective elements of health that goes beyond using evidence from randomised control studies. This methodology needs to be one that can be tested and applied within a practical planning context;

- This can involve developing an evidence base of health challenges within specific case study contexts that can be conceptualised within the framework; and
- Development of an evaluative strategy to evaluate the transferability of health evidence into interventions in higher density precinct settings; and which,
- Should involve using both qualitative and quantitative methods for measuring health and quality of life, and
- Should focus on measuring and evaluating outcomes from different temporal perspectives, including the more distant long term outcomes as outlined by the Planetary Health approach;

5. Embed the conceptual framework into a range of planning policy and practice documents and activities to aid the development of health informed evidence-based planning strategies for higher density living. This should involve:

- Embedding the conceptual framework to test its effectiveness in practice;
- Revising the framework as appropriate
- Developing a checklist for planners to use to implement this conceptualisation of health into planning policy and practice
- Developing a communications strategy for communicating this framework to planning and health professionals from a wide range of institutions

3.7 Actions

The following actions will be undertaken to develop these recommendations within the scope of the project:

- Undertake a review of Government, Industry and Policy Literature pertaining to the New South Wales context to explore how health is currently being conceptualised within planning policy documents and to examine if this conceptualisation has changed over time
- Conducting an evaluation of existing planning policy with particular reference to the Green Square and Victoria Park case study sites to identify opportunities for expanding upon and challenging existing perspectives of health drawing on the attributes and approaches to health detailed in the literature
- Organise a series of workshops that bring together a range of planning professionals and academics from a variety of academic disciplines to collectively develop a new conceptual framework and to map the different attributes associated with health in higher density contexts into the framework
- Identify existing conceptual frameworks for Socio-Ecological Determinants of Health approaches and Planetary Health frameworks which can then be used to help develop the new conceptual framework for health in higher density contexts
- Work with planning professions to develop the checklist and communications strategy, particularly how it can be communicated to professionals associated with planning, but who planners do not have direct influence over
- Conduct interviews with planning professionals to understand how 21st century public health challenges, such as climate change and population growth, are currently being understood and addressed within the planning context
- Conduct focus group workshops to foster collective discussion about how the promotion of human health can be better aligned with environmental health through the promotion of higher density living developments.
- Conduct further research to identify a suite of evaluative and measurement tools that can be used to construct an evaluative framework and work with members of the project team to identify a framework for measuring subjective as well as objective dimensions of health.
- Identify potential existing outlets for the conceptual framework, for example through revised versions of existing guidelines for health promotion, revised versions of needs assessments or within existing health impact assessments, and identify new opportunities for disseminating and implementing outputs through other communication channels, including presentations at national and international conferences, appropriate media outlets and through the publication of academic articles.

4. How can planning strategies support healthy higher density living?

4.1 Defining ‘Planning Strategies’

Many of the articles reviewed (64 out of 141) presented suggestions as to how planning policy and practice can better support higher density living. However, the terms ‘planning’ and ‘planning strategies’ need to be clearly understood before we can understand how healthy higher density living be better supported through improvements in planning strategy development.

4.1.1 Defining Planning

None of the articles within the sample provided a comprehensive definition of either planning or planning strategies. However, a definition can be found within the wider planning literature. According to Barton (2015: 4), planning can include the ‘bureaucratic’ processes of ‘land use control’ and also ‘spatial planning’ meaning the social, economic, ecological and aesthetic’ dimensions (Barton 2015: 4). According to Healey, (2013: 19) planning has three dimensions, which are ‘normative’, ‘methodological’, ‘political’, and a focus on ‘how people live their lives in association with all kinds of others’ Planning may also be viewed as a form of ‘societal guidance’ (Freidman’s 1973 in Healey 2011: 198). Similarly, Bertolini’s (2009: 309 in Healey 2011: 198) argues that ‘Planning involves the task of shaping conditions for other beings to be empowered… It is the task of making the co-existence in space of a diversity of human projects and interactions possible.’

Another dimension of planning is those individuals or professions who are part of the planning process. Healey (2011: 197) highlights the lack of clarity about who planners actually are:

‘We refer to ‘planners’ as if it is clear who they are wherever we encounter them in the world. In this way, we generalise and essentialise planning and planners into some kind of ‘universal’ phenomenon. However, Barton (2015: 4) provides a clear outline of the individuals who are involved in planning: ‘town planners, urban designers, architects, landscape architects, transport engineers, land surveyors, economic development officers and sectoral planners’.

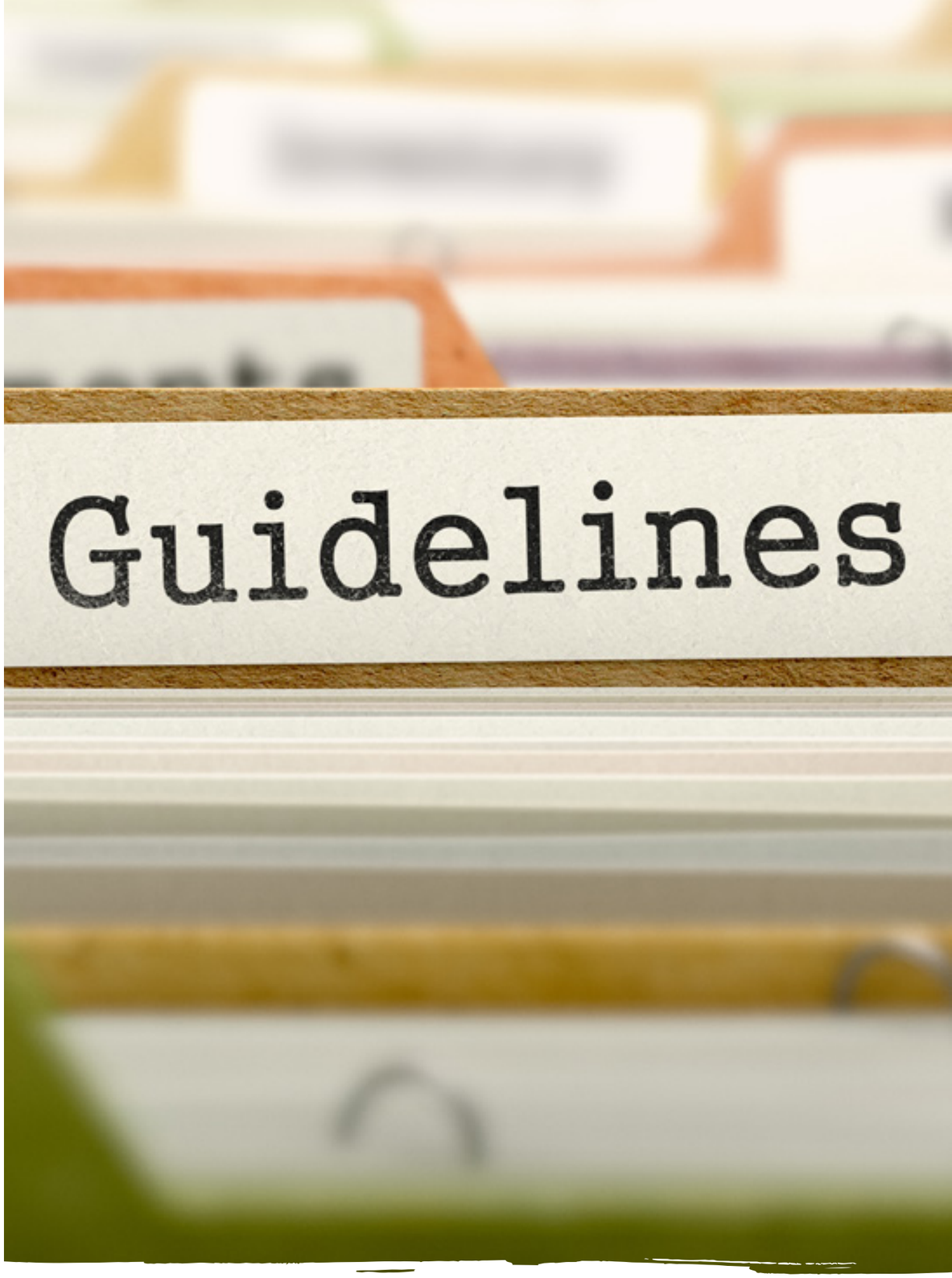
4.1.2 Defining ‘Planning Strategies’

Regarding strategies, the literature provides some detailed suggestions for defining planning strategies. Barton (2015) suggests that planning strategies can be broken down into two key types:

- Bureaucratic and/or
- Action-based strategies or interventions.

Under the umbrella of bureaucratic strategies are:

- Legislation,
- Policies,
- Plans,
- Guidelines,
- Tools.



In summary, bureaucratic strategies means the formal documented texts, which are used as a basis to guide planning (but which are not necessarily enacted). Legislation is a key aspect of bureaucratic strategies, which gives a regularity context as this mandates planning approaches and provides some power to force compliance, with repercussions for non-compliance. An example of a bureaucratic strategy is offered by Badland et al., (2013) who refer to the development of tools to test walking in neighbourhoods.

Action-based strategies or interventions follow on from bureaucratic strategies, in that they are enacted or implemented in a real and/or physical sense. This may be after a plan has been documented, or, as part of the planning process. These interventions can include changes to:

- Land use policies (Barton 2015),
- Building controls (Barton 2015: 6),
- Standards for green space (Davern et al., 2017),
- Preserving open spaces (Kent and Thompson 2014: 240),
- Infrastructure in relation to transport, energy, water, health and education (Barton 2015: 6) and street connectivity (ibid).

Design interventions are also enacted as part of action-based planning strategies, including:

- Site selection and appraisal developers (Barton 2015: 6),
- Design of buildings, streets and landscapes, master planning or estates and
- neighbourhoods (Barton 2015: 6), and
- Built environment features, such as location, height, land use mix and design (Davern et al., 2017), street design features.

Action-based strategies can also include participatory processes by:

- Collaboratively involving stakeholders.

4.2 Suggestions for improving planning strategies for healthy density living

Each of the three broad theoretical conceptual categories of health within the literature sample highlight a number of distant and overlapping suggestions for improving planning policy and practice to support healthy higher density living, with suggestions being framed by each distinct conceptualisation of health.

4.2.1 Limitations evident within current planning strategies

The suggestions that the articles make are drawn on the basis on evidence of existing and emerging problems that the authors argue are not being adequately addressed by current planning strategies. Additionally, other suggestions are made in light of the lessons learnt from previous planning failures in specific historic higher density contexts. For example, several articles grouped in the Global Health category (5 out of 14) discuss how current planning strategies lack preparedness to cope with the health impacts of increasing urbanisation and 21st century demographic change (Bunker and Holloway 2007; Easthope and Judd 2010, Grant et al., 2017, Hanlon et al., 2012, Searle 2007).

Articles within the Socio-Ecological Determinants of Health category (3 out of 109) argue that current planning strategies remain overly focused on individual rather than community satisfaction and quality of life, leading to failure to fully encourage social interaction for improving health outcomes (Anderson 2009, Gifford 2007, Gunn et al., 2017). Easthope and Judd 2010). In addition, four articles suggest that current strategies fail to fully acknowledge the significance of subjective as well as objective perspectives of health, randomised controlled evidence and epidemiological measurements of health (Easthope and Judd ibid, Foster 2006, Raman 2010, Lofti and Koohsari 2009), while two suggest a lack of appreciation is given to the importance of human behaviour for achieving desired health improvements (Giles-Corti et al., 2014, Buys and Miller 2012). Another criticism of existing approaches to planning made in the articles grouped within this category (3 out of 109) is that planning strategies tend to view factors supporting positive health outcomes in isolation rather than in terms of how the different factors inter-relate in leading to health outcomes (Anderson 2009, Easthope and Judd 2010, Duff 2012). A significant number of articles within this group (6 out of 109) argue that the significance of particular local context, including the historical, socio-demographic, socio-economic and socio-cultural characteristics particular to that context, are undermined in current strategy developments (Johnson-Lawrence et al., 2015, Gunn et al., 2017, Randolph 2006, Allen and Blandy 2004, Seo and Chiu 2014, Gifford 2007).

According to a number of articles within the planetary health perspective (18 out of 20), too little attention is given to addressing the problems caused by anthropogenic climate change on human health, the long-term consequences of environmental degradation, and the role that the natural environment plays in supporting human health in existing planning strategies (see Wells et al., 2015 and Jowell et al. 2017 for examples).

In addition, the current limitations that can be identified within existing planning strategies fall into two distinct parts of the planning process:

a. Approaches to the development of planning strategies (bureaucratic level)

b. The implementation of actions and design interventions outlined within the strategy developments (action-intervention level).

According to the articles within the sample, the existing limitations in planning strategies outlined above result from shortcomings and limitations in both stages of this process. Articles within the Global Health category (4 of 14) suggest that the existing limitations result from a lack of integration between planning and health professionals within the policy development stage, as well as a lack of transparency with regards to health evidence that planners could utilise to improve outcomes (see Grant et al. 2017, Hanlon et al. 2012). Articles located within the Socio-Ecological Determinants of Health perspective also emphasise a lack of integration between planning and health in strategy development (10 out of 109), but this perspective also highlights how existing power trajectories of information sharing, decision-making and embedding evidence limits innovation and creative change within existing planning developments (Giles-Corti et al. 2014, Easthope and Judd 2010, Costello 2005, Lloyd and Reid 2013, Randolph 2005, Seo 2002). Articles grouped within Planetary Health category (3 out of 20) also emphasise a lack of integration at the early stage of planning policy development, which leads to the perpetuation of existing approaches to strategy development rather than the development of new approaches based upon alternative conceptualisations of the relationship between health and the environment.

Articles grouped within each of the three theoretical perspectives of health make specific suggestions about how approaches to planning policy and strategy development can be improved to overcome existing limitations at the bureaucratic level (33 out of 141). From this, they suggest specific action-interventions that should be embedded within the new strategies that result from these new approaches to planning development in order to improve health outcomes in higher density contexts (36 out of 141 articles).

4.2.2 Improving existing approaches to the development of planning policy at the bureaucratic level and action intervention levels

A range of suggestions are presented in the sample of articles for improving existing approaches to planning strategy development at the bureaucratic level. These are suggestions are grouped under the specific theoretical conceptualisations of health that underpin each article's suggestions:

4.2.2.1 Suggestions from Global Health for improving existing approaches to planning at the bureaucratic level

Six articles (of 14) that utilised a Global Health approach explained how planning strategies might be used to support healthier higher density living (Barton et al., 2010, Giles-Corti et al., 2012, Grant et al., 2017, Hanlon et al., 2012, King et al., 2018, Wells et al. 2010)

a. Utilising a multi-levelled, multi-scaled approach (Giles-Corti et al., 2012, Grant et al., 2017, Hanlon et al. 2012)

Three out the 14 articles suggested that planners and health professionals should adopt a multi-levelled, multi-scale approach to urban public health planning. For example, Giles-Corti et al., 2016 argues that designing healthy higher density cities requires a multi-levelled, multi-sectoral response to determine positive human health outcomes.

b. Adopt a transdisciplinary approach (Barton et al., 2010, Giles-Corti et al., 2012, Grant et al., 2017, Hanlon et al., 2012, King et al., 2018, Wells et al. 2010)

Five out of 14 articles emphasise that a transdisciplinary approach needs to be taken to successfully plan for 21st century higher density living and to meet the challenges associated with increased urbanisation and a changing demographic profile amongst urban residents. For example, Grant et al., (2017: 3) argues that these challenges can only be overcome by transforming existing approaches to planning policy to ensure positive public health outcomes, which requires the amalgamation of the existing silos that characterise relations between urban planning, transport planning, environment and public health professionals.

c. Move from randomised control evidence to greater governance for health (Barton et al., 2010, Grant et al., 2017, Hanlon et al., 2012, Wells et al., 2010)

Four out of 14 articles suggest that planning strategies can be improved by moving from randomised control evidence for health to an approach characterised by greater governance for health (Barton et al., 2010, Grant et al., 2017, Wells et al., 2010, Hanlon et al., 2012). One out of these four articles emphasises the need for national, regional and local planning policy to be underpinned by an awareness of global urbanisation trends, which will affect upon public health at the lower scale (Grant et al., 2017). Another of the 4 articles argues for a transformative approach to public health and planning, wherein 'greater attention within planning is paid to how health is actually created rather than focusing on its traditional remit of promoting and protecting health, preventing ill-health and prolonging life (Hanlon et al. 2012: 313). 4 out of the 4 articles discuss how health evidence should be used to drive policy development so that health service planning can features heavily in the design of new living environment (Barton et al., 2010, Grant et al., 2017, Hanlon et al., 2012, Wells et al. 2010,). Similarly, all 4 of these articles (Barton et al., 2010, Grant et al., 2017, Wells et al. 2010, Hanlon et al., 2012) suggest that both planning and public health policy development should move towards placing greater emphasis on governance for health to harness urban design.

d. Adopt a longer-term outlook (Barton et al., 2010, Hanlon et al., 2012, Wells et al., 2010)

3 out of the 14 (Hanlon et al., 2012, Wells et al., 2010, Barton et al., 2010) articles suggest that planning and public health policies need to move towards placing greater emphasis on governance for health, harnessing urban design and designing transport for health improvements on a much longer-term basis than at present.

e. Consider how international political and economic forces affect health (Grant et al., 2017, and Giles-Corti et al. 2012, King et al., 2018)

Three out of the 14 articles (King et al., 2018, Grant et al., 2017, and Giles-Corti et al. 2012) suggest that greater attention needs to be placed on how international political and economic forces affect health in the policy and planning stages of planning strategy development. For example, King et al., (2018) discusses how external political and international economic forces affect neighbourhoods, which can affect the mental health of residents, and which should be prioritised in healthy planning strategies. King et al., (2018) also suggests that healthy planning should be guided by considerations for improving health equity in the terms recognised by the World Health Organisation Healthy Cities Project to ensure that new strategies fully recognise current international global health challenges.

f. Consider to a greater extent how local social and economic contexts affect health by adopting a dual local-global approach rather than neglecting the significance of local context for influencing health (King et al., 2018)

One out of the 14 articles (King et al., 2018) emphasises that greater consideration needs to be made of the local social and economic contexts when developing planning strategies. According to King et al., (2018) planners and policy makers need to consider: 1) The demographic profile of the residents; 2) lifestyle factors such as diet, physical exercise and work-life balance; 3) community networks; 3) The local economy, 4) Access to public space, 5) The design of the build environment, and 6) The natural environment. Where these factors can be seen to be actively promoting positive health outcomes, they ought to be sustained. However, where one or more are lacking or promoting negative behaviours, planning and health professionals should aim to improve on that area through selective design of aspects of the built environment (ibid).

4.2.2.2 Suggestions from Global Health for specific action and design interventions that should be embedded within an improved approach to planning for healthy higher density living

Two out of the 14 articles within the Global Health category provide suggestions for specific action and design interventions that can be embedded into planning strategies to improve health outcomes in higher density contexts:

a. Provide infrastructure and transport provision to enable positive health outcomes (Easthope and Judd 2010, Giles-Corti et al., 2012)

Easthope and Judd (2010: 4) highlight the need for infrastructure and transport provision to enable positive health outcomes.

b. Build up rather than out (Easthope and Judd 2010)

One article, Easthope and Judd (2010) argues that density needs to 'build up' rather than 'build out' to reduce and to mitigate the negative health outcomes associated with urban sprawl and lower density suburban development.

c. Design dwelling sizes to meet the needs of a changing demographic profile and socio-economic context (Easthope and Judd 2010)

One article, Easthope and Judd (2010) suggests that to ensure local higher density developments meet the needs of the emerging urban demographic profile; neighbourhoods need to include a variety of sizes of dwelling, which are affordable to those on low to medium incomes as well as to those on higher incomes.

d. Design and implement public spaces, transport networks, appropriate street networks and mixed land use (King et al., 2018)

Another article, King et al., (2018), argues that planners need to consider the design and availability of public spaces and transport networks, the design of street networks and the perceived and actual safety of an area, to promote positive health outcomes. They also need to promote mixed land use including housing, industry, retain, commercial, education and recreation in close proximity, and influence greater compactness in dwelling environment (King et al., 2018: 17). A 400-500 meter radius is a comfortable walking distance for most people and this distance should be used as a basis for designing access to a range of services for meeting daily needs, including shops, open space, community facilities and urban transport (ibid). In New South Wales, guidance recommends that 400 meters to be considered to be a reasonable walking distance to a bus stop (ibid). Street connectivity should promote direct travel routes and the aesthetic design should be encouraging for walkers and cyclists and should include footpaths and cycle ways, shaded areas, pedestrian only zones, and interesting streetscapes. This should help to combat rates of physical and mental ill health that result from sedentary lifestyles and social isolation. King et al., (2018) also gives suggestions about what planners should avoid, which include locating shops far from houses and uniform, and predominantly detached, housing residential areas, and locating housing in areas that lack nearby employment opportunities, which result in people having to travel long distances to and from work (ibid).

4.2.2.3 Suggestions from Social-Environmental Determinants of Health Perspectives for improving planning strategies at the bureaucratic level

Thirty-four out of the 109 articles grouped within the Social-Environmental Determinants of Health Perspectives include suggestions for improving existing planning strategies at the bureaucratic level to overcome the shortcomings identified in section 4.2.1.

a. Consider the role of the built environment and how it overlaps with social factors in optimising specific behaviours associated with improving health outcomes (Anderson 2009, Black and Macinko 2008, Barton et al., 2009, Buys and Miller 2012, Duff 2012, Easthope and Judd 2010, Giles-Corti et al., 2014, Haigh et al., 2011, Kent and Thompson 2014, Thompson 2013)

Ten out of these 34 articles stress the need for consideration of the different social and environmental determinants of health in planning policy and practice guidelines, particularly how the role of the built environment can optimise specific behaviours associated with improving health outcomes (see Giles-Corti et al., 2014, Kent and Thompson 2014, Thompson 2013, Black and Macinko 2008, Barton et al., 2009, Haigh et al., 2011, Buys and Miller 2012, Anderson 2009, Easthope and Judd 2010, Duff 2012). As a result, planners must focus on how the design of higher density built environments can optimise active transport, public transport and social interaction. For example, Giles-Corti et al., (2014) describes how the National Liveability Study, funded through the Australian Prevention Partnership Centre, developed a set of spatially derived built environment liveability indicators that impact upon non-communicable disease risk behaviours and health outcomes in densely populated city environments. Use of these indicators at an early stage of the planning process could therefore help to ensure that liveability for positive health outcomes and quality of life are embedded into the design of new higher density developments. Similarly, Kent and Thompson (2014) argue that understanding the linkages between health and the built environment can help to foster understanding amongst professions about the relational processes that underpins built environment health outcomes and highlight how built interventions support human health as they address the major risk factors for chronic disease (ibid).

b. Consider the different scales and which social and environmental determinants influence health outcomes for consideration in planning for healthy higher density development (Black and Macinko 2008, Johnson-Lawrence et al., 2015, Gunn et al., 2017, Randolph 2006, Allen and Blandy 2004, Gifford 2007, Badland et al., 2015, Badland et al., 2017, Beer and Faulkner 2009, Bunker et al. 2002, Burton 2000, Cho et al., 2017, Christian et al., 2017, Costello 2005, Fincher 2004, Haarhoff et al., 2016, Holman et al. 2015, Jabareen 2006, Kent 2015, Kent and Thompson 2014, Carmona 2014, Komissa 2011, Kalchevea et al., 2015, Kane and Whitehead 2018, Lloyd and Reid 2013, Lowe et al., 2015, Lu and Ye 2017, Seo and Chiu 2014).

Twenty-eight of the 34 articles within this category suggest that planning strategies can be improved by undertaking greater consideration of the local and regional social and environmental determinants when developing guidelines and specific plans, in addition to global factors which also have an impact on shaping health outcomes at a local level (Black and Macinko 2008, Johnson-Lawrence et al., 2015, Gunn et al., 2017, Randolph 2006, Allen and Blandy 2004, Gifford 2007, Badland et al., 2015, Badland et al., 2017, Beer and Faulkner 2009, Bunker et al. 2002, Burton 2000, Cho et al., 2017, Christian et al., 2017, Costello 2005, Fincher 2004, Haarhoff et al., 2016, Holman et al. 2015, Jabareen 2006, Kent 2015, Kent and Thompson 2014, Carmona 2014, Komissa 2011, Kalchevea et al., 2015, Kane and Whitehead 2018, Lloyd and Reid 2013, Lowe et al., 2015, Lu and Ye 2017, Seo and Chiu 2014). For example, Black and Macinko's (2008) framework for understanding how neighbourhoods influence obesity draws attention to the relationship between macro, micro and individual-level factors, behaviours, and outcomes. This can be useful for highlighting the different scales and which social and environmental determinants influence health outcomes for consideration in planning for healthy higher density development (ibid). 6 of these 28 articles discuss the importance of acknowledging the

historic, socio-demographic, socio-economic and cultural characteristics of a particular development site throughout all stages of the planning strategy development to ensure that the strategy is fully embedded in the specific local context (Johnson-Lawrence et al., 2015, Gunn et al., 2017, Randolph 2006, Allen and Blandy 2004, Seo and Chiu 2014, Gifford 2007).

c. Utilising 'health maps' to highlight the interdependent interactions between the different factors that influence health outcomes (Barton et al., 2006, Haigh et al., 2011)

Two out of the 34 articles discuss how health maps can be used to highlight the interdependent and interactional nature of the factors that contribute to health outcomes in a high-density urban environment (Barton et al., 2006, Haigh et al., 2011: 15).

d. Use subjective as well as objective evidence and perspectives of health (Easthope and Judd ibid, Foster 2006, Lofti and Koohsari 2009, Raman 2010)

Four out of the 34 articles highlight the need for planning strategies to acknowledge the significance of subjective perspectives of health and measurements of health for ensuring positive health outcomes (Easthope and Judd ibid, Foster 2006, Lofti and Koohsari 2009, Raman 2010).

e. Acknowledge the importance of human behaviour for influencing health outcomes (Buys and Miller 2012, Giles-Corti et al., 2014).

Two articles specifically suggest that greater acknowledgement should be made by planning professionals of the importance of human behaviour in influencing health outcomes, particularly in devising criteria for measuring the success of specific health interventions in a planning context (Buys and Miller 2012, Giles-Corti et al., 2014)

f. Focus on community health and quality of life rather than individual health outcomes for improving planning strategies (Anderson 2009, Gifford 2007, Gunn et al., 2017)

Three articles out of the 34 highlight the need for planning guides and processes to be focused upon improving community health and quality of life rather than for improving health outcomes in order to improve the health of the total population and for reducing health inequalities across the overall population (Anderson 2009, Gifford 2007, Gunn et al., 2017).

g. Focus on improving health equity through planning strategy development (Allen and Blandy 2004, Gifford 2007, Gunn et al., 2017, Haigh et al. 2011, Johnson-Lawrence et al., 2015, Randolph 2006, Seo and Chiu 2014)

Seven out of the 34 articles that offer suggestions for improving planning strategies from a Socio-Environmental Determinants of Health perspective suggest that planning should be guided by considerations for improving health equity in a way that ensures that planning professionals understand their own specific roles in promoting health equity (Haigh et al. 2011, Johnson-Lawrence et al., 2015, Gunn et al., 2017, Randolph 2006, Allen and Blandy 2004, Seo and Chiu 2014, Gifford 2007). One of these articles, Haigh et al., (2011), takes this suggestion further by detailing how the strategy development process should also seek to ensure that planning professionals understand the consequences of planning design in terms of health equity. Haigh et al., (2011) also explains that early engagement of health professionals in planning is more likely lead to improved health outcomes through longer-term feedback processes on draft versions of publicly exhibited policies, plans and proposals. Maximum influence on health outcomes can be achieved when there are opportunities for all players to contribute at the earliest stages of a project's inception (ibid). This is known as 'upstream participation' and involvement of health professionals from the start is more effective for enhancing health through built environment design than asking a proponent to amend an already formulated and drafted policy or plan (ibid: 27). This can be achieved using a checklist, such as the New South Wales Healthy Urban Development Checklist, and by ensuring that health professionals have prior knowledge of the planning system and development process to participate on a proactive basis early on in the development process (ibid.

h. Investment in active and public transport (Newman et al., 2015)

One of the 34 articles offering suggestions based on a Socio-Determinants of Health perspective suggests that planners need to financially invest heavily in transport, biking and pedestrian infrastructure to deliver the urban fabric needed to achieve the deep social transformation required to end automobile dependence (Newman et al., 2015).

i. Develop cross-sectoral collaborative partnerships to ensure maximum health benefits through planning strategy development (Bunker et al., 2002, Easthope and Judd 2010, Haigh et al., 2011, Randolph 2005, Thompson and Paine 2017).

Five articles specifically discusses that because healthy urban development occurs at the intersection between planning and health, cross-sectoral partnerships are necessary for ensuring that ideas remain relevant over time so that maximum benefit can be achieved (Haigh et al., 2011: 16, Thompson and Paine 2017, Bunker et al., 2002, Easthope and Judd 2010: 17-18, Randolph 2005). Understanding the wider determinants of health also 'opens up a range of opportunities for collaboration and partnerships', including partnerships with social workers departments and other government and private industry personnel, who have knowledge to contribute to each other's work (Thompson and Paine 2017). Collaborative relationships are also important for enabling early engagement and more proactive approaches to development (Easthope and Judd 2010, Randolph 2005).

j. Develop and apply checklists to encourage ongoing processes of collaboration in the strategy development process (Haigh et al., 2011)

One article, Haigh et al., (2011: 31), also suggests that checklists can help to encourage ongoing processes of engagement and mutual development planners and health professionals that can help to ensure that 'planning and development become more health promoting over time'

k. Ensure planning and health organisations strengthen their own capacities to maximise collaborative effectiveness (Haigh et al., 2011)

One out of the 34 Socio-Ecological Determinants articles that includes suggestions for improving approaches to planning strategy development highlights the importance for planning and health organisations to strengthen their own capacity, including resources and commitment to health improvement, in order to maximise the effectiveness of collaborative working and co-development of healthy urban living plans (Haigh et al., 2011: 31).

l. Enhancement of a shared sense of responsibility for improving residential satisfaction through planning

Two articles emphasise that planning professionals need to work more closely with health professionals to identify the factors that influence residential satisfaction in order to assist in the planning and design of neighbourhoods (Giles-Corti et al., 2014, Randolph 2006). This can help to ensure a lower resident turnover rate and facilitates greater acceptance of higher density living as a long-term housing choice (Randolph ibid). This can also help to enhance community cohesion and inclusion in higher density environments (ibid).

m. Develop strategies that challenge culturally-specific preferences for lower density housing (Giles-Corti et al., 2014, Randolph 2006)

Two articles argue that in Australia there is a need to challenge long-standing cultural values that prefer lower density as part of the process of promoting higher density living (Randolph: 2006, Giles-Corti et al., 2014).

n. Introduce co-learning opportunities as part of professional education for planners (Haigh et al., 2011)

One out of the 34 articles highlights that to promote behaviour change to enhance the equity of physical and mental health outcomes and reduce inequalities across different socio-demographic groups, co-learning opportunities that involve both health and planning professionals should be considered as a fundamental part of professional education for planning professionals (Haigh et al. 2011).

o. Engage with members of the public from diverse backgrounds to inform planning strategy developments (Acioly and Davidson 1996, Bunker et al., 2002, Easthope and Judd 2010: 17-18, Fincher 2004, Haigh et al. 2011, Hancock 2017, Kent 2015, Randolph 2005, Reid et al., 2017, Thompson and Paine 2017).

Ten out of the 34 articles embedded on a Socio-Ecological Determinants perspective of Health which make suggestions for improving existing approaches to planning suggest that approaches to strategy development not only need to be context specific but actively involve residents and other members of the public from different socio-demographic groups to inform the development of the strategies (Acioly and Davidson 1996, Bunker et al., 2002, Easthope and Judd 2010: 17-18, Fincher 2004, Haigh et al. 2011, Hancock 2017, Kent 2015, Randolph 2005, Reid et al., 2017, Thompson and Paine 2017). Two out of these 10 articles argue that greater attention to women's experiences and needs for higher density living and design of the built environment needs to be given to improve unequal gendered health behaviours and quality of life (Fincher 2004, Reid et al., 2017). Four of the 10 articles emphasise that professionals should consider residential developments with the needs of specific vulnerable population groups in mind, including single parents and persons with disabilities (Acioly and Davidson 1996, Haigh et al. 2011, Kent 2015, Thompson and Paine 2017). One of these articles states that extra effort may need to be made to involve people from marginalised groups in planning processes as they are more likely to experience social exclusion and are less likely to come forward to participate of their own initiative (Hancock 2017).

p. Obtain and use evidence specific to a particular national context when devising planning strategies (Bunker et al., 2002, Easthope and Judd 2010: 17-18, Randolph 2005, Thompson and Paine 2017)

Four out of the 34 articles that offer suggestions for improving planning strategy development from a Socio-Ecological Determinants of Health at the bureaucratic level stress that the use of evidence-based approaches in planning strategy development needs to be undertaken with care, especially when they involve applying evidence from different countries as the context and experience of higher density living in the UK, South Asia and US is different from the Australian context (Bunker et al., 2002, Easthope and Judd 2010: 17-18, Randolph 2005, Thompson and Paine 2017). Instead, planning professionals should engage with health professionals, social researchers, education departments and third sector professionals to obtain evidence and a level of understanding of the needs of a specific community group to develop a context-specific supportive infrastructure to promote health equity (Thompson and Paine 2017). Without this knowledge, planning agenda risk reinforcing and exacerbating health inequalities, especially if a uniform agenda is followed (ibid). Two of the articles also discuss how planning professionals need to together with both private and public sector developers to achieve this context specificity and to reduce the issue of segmentation between different submarkets in order to promote diverse, socially mixed communities (Easthope and Judd 2010, Randolph 2005).

4.2.2.4 Suggestions from Social-Environmental Determinants of Health Perspectives for improving planning strategies at the design and action implementation level

Thirty-six out of 109 articles grouped within the Socio-Ecological Determinants of Health perspective present suggestions for how to improve existing planning strategies at the design and action implementation level.

Details of these suggestions are provided below:

a. Identification and implementation of specific features of quality of life in Australia into planning design (Badland et al., 2015, Buys and Miller 2012, Hu et al., 2016, Kent 2015, Kent and Thompson 2014, Nicolls et al., 2017, Ormandy and Ezratty 2016, Roulet et al., 2016, Vandentorren et al., 2006, Wilson et al., 2008)

Ten out of the 35 articles identify specific features of quality of life that need to be implemented into higher density planning designs to enable the built environment to create favourable health conditions (Badland et al., 2015, Buys and Miller 2012, Hu et al., 2016, Kent 2015, Kent and Thompson 2014, Nicolls et al., 2017, Ormandy and Ezratty 2016, Roulet et al., 2006, Vandentorren et al., 2006, Wilson et al., 2008). These include ensuring that neighbourhood and dwelling position enable social interaction, ensuring safety from traffic, crime and noise pollution (Buys and Miller 2012, Kent 2015). Other articles focus on implementing strategies to ensure optimal thermal comfort to improve quality of life, particularly for those deemed to be more vulnerable to the impacts of temperature extremes, including elderly people, young children and those from a low socio-economic background (Hu et al., 2016, Nicolls et al., 2017, Ormandy and Ezratty 2016, Roulet et al., 2006, Vandentorren et al., 2006, Wilson et al., 2008).

b. Implementation of land use mix and housing diversity into planning designs (Badland et al., 2015, Chan and Liu 2018, Giles-Corti et al., 2012, Haarhoff et al., 2016, Hu et al., 2016, Wilson et al., 2008)

Six articles (Badland et al., 2015, Chan and Liu 2018, Giles-Corti et al., 2012, Haarhoff et al., 2016, Hu et al., 2016, Wilson et al., 2008) discuss how land use mix and diversity of housing type can enhance liveability and health outcomes because 'it impacts housing choice, which in turn, underpins a walkable community' (Badland et al., 2015: 31), and because it can influence the urban heat island effect that affects the indoor and outdoor

temperatures in higher density environments (Chan and Liu 2018, Hu et al., 2016, Wilson et al., 2008).

c. Limit car use through planning design (Bramley et al., 2006; Haarhoff et al., 2016, Kent and Thompson 2014)

Three out of the 36 articles discuss how car use should be limited to promote walkability and reduce air pollution through careful planning design (Bramley et al., 2006; Haarhoff et al., 2016, Kent and Thompson 2014).

d. Provide opportunities to involve residents in place-shaping activities (Haarhoff et al. 2016, Lyons 2007)

Two articles argue that provision should be made during the development stages of planning to involve residents in local urban planning activities and later on in the development process to involve residents in place-shaping activities (Haarhoff et al. 2016, Lyons 2007). This can help to foster resident satisfaction and self-esteem (Haarhoff et al., ibid).

e. Develop public spaces as part of a co-production process to planning (Holliday 2006)

One of the 36 articles, Holliday (2006), emphasises the significance of the development of public spaces in higher density contexts for enhancing physical and mental ill health via increasing community cohesion. In addition, Holliday (ibid) argues that this approach is best undertaken as part of a 'co-production' rather than a top-down development process to allows for local involvement, which helps enhance resident self-confidence and agency in decision-making for improving health outcomes in residential settings.

f. Design space for a variety of multiple uses to meet the health needs of people at different stages of their lives (Giles-Corti et al., 2012: 14, Holliday 2006, Quigley and Ball 2007, Strath and Greenwald 2007)

Four out of the 36 articles offering suggestions for improving the design and action intervention stages of existing planning strategies embedded in a Socio-Ecological Determinants of Health perspective argue that high-density environments need to be specifically designed to meet the health needs of people at different stages of the life course (Giles-Corti et al., 2012: 14, Holliday 2006, Quigley and Ball 2007, Strath and Greenwald 2007). Two of these articles suggest that particular attention should be paid to ensuring that local parks are designed for a variety of multiple uses to achieve this target (Giles-Corti et al., 2012: 14, Strath and Greenwald 2007). These articles also suggest that open spaces should be located within a short distance of nearby residents (ibid). One of these articles suggests that links to cultural heritage can provide opportunities for elderly people to share stories about the history of the area, which can help to foster a sense of community (Giles-Corti et al., 2012: 14). Holliday (2006: 24) emphasises that parks and public spaces should be accessible at most hours and include places to sit down and eat or have coffee, as these features are likely to be more important than the formal design aspects. Another of these four articles, Quigley and Ball (2007), discuss how buildings should improve safety for children and residents and should be designed to prevent crime and injury.

g. Use toolkits to design and embed built environment attributes that influence healthy lifestyles (Diez Roux and Mair 2010, Haarhoff et al., 2016)

Two articles out of the 36 focus on how toolkits, such as the Victorian Government 'Activity Centre Toolkit' for promoting higher density, transit-orientated development in Melbourne and the 'Auckland Plan' in New Zealand, can provide specific guidance on attributes that need to be implemented into planning designs to enhance social cohesion and quality of life (Diez Roux and Mair 2010, Haarhoff et al., 2016). To influence physical activity, social interaction, and positive mental and physical health, developments should ensure a high availability of places for residents to be physically active, be safe and aesthetically pleasing, have gyms located nearby which are affordable, and be supported by regional transport infrastructure that increases the availability of public transport and limits automobile use in higher density neighbourhoods (Diez Roux and Mair 2010).

h. Enhance health equity by providing minimum standards for indoor space (Giles-Corti et al., 2012)

One out of the 36 articles detail specific actions that can be undertaken to promote equity of health outcomes. One of these articles suggests that this can include designing built environments to reduce overcrowding and by providing a minimum percentage of housing large enough to accommodate families (Giles-Corti et al., 2012: 9).

i. Reduce gendered health inequality through design of the built environment (Jabareen 2006, Powers 2013, Randolph 2005, Sherry and Easthope 2016, Shi 2017, Yang 2009)

Six out of the 36 articles focus on improving gendered health outcomes through the design of the built environment (Jabareen 2006, Powers 2013, Randolph 2005, Sherry and Easthope 2016, Shi 2017, Yang 2009). Four of these draw attention to learning lessons from previous experiences of poor built environment design to improve health for women, children, families and older people (Powers 2013, Sherry and Easthope 2016, Shi 2017, Yang 2009). For example, Sherry and Easthope (2016) argue that to enhance child development, higher density environments need to provide easy access to schools. Planners therefore need to consider current and anticipated demands for school places within the wider educational context regarding access to schools (ibid). One article, Jabareen (2006), suggests that negative perceptions about higher density environments can be challenged with the following sustainable urban form design concepts: compactness, sustainable transport, mixed density, mixed land uses, population diversity and greening. Another article, Randolph (2005), argues that features of the dwelling, including position, design, size of rooms, communal facilities, external illumination at night and safety are also significant for promoting greater equality of health outcomes.

j. Design environments to encourage active transport using design models and procedures (Giles-Corti et al., 2014, Matan et al., 2015, Zhang et al., 2012)

Three of the 36 articles discusses how design of the built environment can encourage active transport and walking behaviour (Giles-Corti et al., 2014, Matan et al., 2015, Zhang et al., 2012). One of these articles states that a net density threshold of 20 dwellings per hectare or a gross density of 18 dwellings per hectare is the minimum density required to encourage transport walking (Giles-Corti et al., 2014). Zhang et al., (2012) discusses how a backwards stepwise elimination procedure can be used to identify specific design features that show associations with walking behaviour to enhance physical activity levels. Matan et al., (2015) suggests that design models can predict health outcomes, which can then be used to incorporate activity-related health impacts of transit use into precinct assessment model.

k. Draw on existing guidelines and indicators of human development to improve health equity in the design of the higher density built environment (Hancock et al., 2017)

Another one out of the 36 articles, Hancock et al., (2017), emphasises that equality of health outcomes can be enhanced through the amendment and implementation of specific guidelines, such as the Medellin City Council guidelines, that were based on the concept of 'social urbanism' to ensure that specific indicators of human development and quality of life guides public investment and built environment design and prioritised the needs of the most vulnerable population groups (ibid: 96-98). This can help to ensure that education and culture can be cultivated in higher density environments that promote social co-existence to improve health and quality of life for all, and especially those from marginalised groups (ibid).

l. Design and implement specific design features to enhance social interaction (Easthope and Judd 2010, Giles-Corti et al., 2012, Kalcheva et al., 2015, Pomeroy 2011, Setti 2013, Wener and Carmalt 2006)

Six out of the 36 articles discuss how planning professionals can design and implement specific built environment features to enhance social interaction (Easthope and Judd 2010, Giles-Corti et al., 2012, Kalcheva et al., 2015, Pomeroy 2011, Setti 2013, Wener and Carmalt 2006). For example, Easthope and Judd (2010) discuss how providing good neighbourhood amenities, built-in security, shared facilities, recreational spaces; opportunities for selective interactions can reduce health inequity in higher density developments. Setti (2013) highlights how hybrid-type shared spaces, relational spaces, common places and 'interspaces' present alternative and innovative settings for social interaction from traditional meeting spaces, which helps to generate social interaction in a way that challenges traditional socialisation patterns. Two articles discuss how specific features such as sunken and rooftop gardens, elevated plazas, multilevel vertical open spaces and sky bridges can help to create a stimulating environment (Pomeroy 2011, Wener and Carmalt 2006). In addition, one other article explores how investment in public art, cinemas, galleries and museums helps to enhance both human capital and the social value of the development (Kalcheva et al., 2015).

m. Ensure that facilities are provided to enable residents to have access to healthy dietary choices (Sharp 2003, Thompson and Paine 2017)

Two articles (Sharp 2003 and Thompson and Paine 2017) argue that higher density developments should ensure that residents have access to healthy dietary choices to avoid the problems associated with the 1970's tower block estates in the UK wherein the provision of nearby shops and amenities were neglected. Good design and building standards can mitigate health problems associated with overcrowding, sleep deprivation, stress and anxiety (Thompson and Paine 2017). Garden spaces can enable residents to grow and harvest their own food and access to sunlight/daylight in both private and public spaces should be implemented in planning designs to enable this action (ibid). Thompson and Paine (2017) also identified Community Food Box programs and limitations on the number of fast food outlets as key initiatives for promoting positive health, especially amongst lower income groups.

n. Provide ongoing building maintenance (Sharp 2003, Thompson and Paine 2017)

Two articles (Sharp 2003 and Thompson and Paine 2017) suggest that the provision of ongoing building maintenance and management are crucial to improving quality of life for residents in higher density environments.

o. Use conceptual area-level mapping with health indicators to identify potential barriers to healthy living (Badland et al., 2017)

One of the 36 articles specifying suggestions for improving planning strategies at the design and action implementation stages from a Socio-Ecological Determinants of Health perspective, Badland et al., (2017), discusses how the use of conceptual area-level mapping of area-level measures of housing together with selected health and wellbeing indicators can help to identify factors that create barriers to healthy living and can therefore help to identify areas requiring improvement. Badland et al.'s (ibid) study of the spatial testing of housing with health in Melbourne Australia examined associations between housing density, tenure and affordability with individual perceptions of neighbourhood safety, community satisfaction and self-rated health. The study found that equality of outcomes could be improved if developments are located in accessible neighbourhoods. Similar approaches to measuring health in relation to density in other locations could help target areas requiring particular attention (ibid).

p. Ensure that higher density indoor and outdoor built environments offer adequate ventilation and protection from heat (Chan and Liu 2018, Guo et al., 2017, Hu et al., 2016, Roulet et al., 2006, Ormandy and Ezratty 2016, Vandentorren et al., 2006, Wilson et al., 2008, Zhang et al., 2016)

Eight out of the 36 articles discuss how higher density indoor and outdoor built environments need to be designed to ensure adequate ventilation and protection from heat to improve health outcomes (Chan and Liu 2018, Guo et al., 2017, Hu et al., 2016, Roulet et al., 2006, Ormandy and Ezratty 2016, Vandentorren et al., 2006, Wilson et al., 2008, Zhang et al., 2016). Guo et al., (2017), Hu et al., (2016), Roulet et al., (2006), Vandentorren et al., (2006), and Wilson et al., (2008) show how natural ventilation performance in high-density cities can be optimised to prevent the harmful effects of heat on human health by incorporating scattered morphology and green spaces. Hu et al., (2016) suggests that the urban heat island effect can be mitigated by using digital techniques to find the optimum urban form for maximising and minimising the sky view factor (SVF) values in high-density environments. Zhang et al. (2012) argues that sky exposure in densely populated urban areas needs to be maximised as a lack of exposure to natural light can lead to an increase in perceptions of spatial confinement that can have a harmful effect on mental wellbeing. In tropical climates, high-level sky exposure without proper shading can also compromise thermal comfort levels (ibid). However, Vandentorren et al., (2006) discusses how adapting building insulation and using reflective materials can help to provide protection from heat waves.

4.2.2.5 Suggestions from Planetary Health for improving planning strategies at the bureaucratic level

Seven out of the 20 articles embedded within a Planetary Health Perspective offer suggestions for improving planning strategies at the bureaucratic level (Barthol et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Jowell et al., 2017, Pattanayak and Haines 2017, Speak et al., 2012, Watts et al., 2015). Each of the suggestions presented are detailed below:

a. Consider the significance of anthropogenic climate change in approaches to the development of planning strategies (Barthol et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Jowell et al., 2017, Pattanayak and Haines 2017, Speak et al., 2012, Watts et al., 2015).

All seven of the articles that offer suggestions for improving planning strategies at the bureaucratic level from a Planetary Health perspective emphasise that planning and health professionals need to consider climate change when planning for higher density neighbourhood development (Barthol et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Jowell et al., 2017, Pattanayak and Haines 2017, Speak et al., 2012, Watts et al., 2015). All seven emphasise that this needs to involve consideration of adaptation to climate change threats, such as flooding and heat, through built environment change, and more significantly, through mitigation of the greenhouse gas emissions that worsen the impacts of climate change in the long term through innovation of the built environment.

b. Give greater consideration to the role that the natural environment plays in supporting human health in planning policy decision-making (Barthol et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Jowell et al., 2017, Watts et al., 2015)

Five out of the seven articles (Barthol et al., 2010, Bellamy et al., 2017, Davern et al., 2017, Jowell et al., 2017, Watts et al., 2015) argue that planning professionals need to consider to a greater extent the role that the natural environment plays in supporting human health to fully appreciate the threat that is being posed by anthropogenic climate change to human health. For example, Watts et al., (2015) suggest that planning professionals need to embrace a deeper understanding of the interconnectedness between humans and the wider ecological environment on which it depends. Rethinking the relationship between health, humans and the environment can promote transformation in planning practices by challenging core ideas that traditional approaches to practice are embedded upon (ibid).

c. Transition from simple cause and effect approaches to understanding the relationship between health and environment to approaches that recognise the existence of complex multi-dimensional feedback loops between the human and natural environment (Jowell et al., 2017, Watts et al., 2015)

Two articles explain that both planning and health professionals need to rethink the relationship between the human and natural environment and recognise the complexity of the relationship between environmental and human health when planning for improving long-term health outcomes in densely populated urban environments (Jowell et al., 2017, Watts et al., 2015). In particular, Watts et al., (2015) argues that panning professional should move beyond focusing on identifying single issues and problems to consider the complex health sequelae of the natural and built environmental landscapes when approaching health problems through planning strategy development.

d. Adopt a long-term future orientated approach to planning (Barthol et al., 2010, Davern et al. 2017, Jowell et al., 2017, Watts et al., 2015)

Four out of the seven articles (Barthol et al., 2010, Davern et al. 2017, Jowell et al., 2017, Watts et al., 2015) argue that planning professionals to need to be more long-term future orientated than at present in approaches to planning strategy developments than they are at present.

e. Adopt an approach to planning that focuses to a greater extent on enhancing environmental sustainability than at present (Davern et al., 2017, Jowell et al., 2017, Watts et al., 2015)

Three of these articles discuss how this longer-term vision for improving planning approaches should also be more greatly focused on enhancing environmental sustainability as well as human health outcomes (Davern et al., 2017, Jowell et al., 2017, Watts et al., 2015).

f. Include multiple actors from diverse institutions to develop new approaches to planning strategy development (Barthol et al., 2010, Davern et al. 2017, Jowell et al. 2017, Pattanayak and Haines 2017, Speak et al., 2012, Watts et al. 2015)

Six out of 7 articles (Barthol et al., 2010, Davern et al. 2017, Jowell et al. 2017, Pattanayak and Haines 2017, Speak et al., 2012, Watts et al. 2015) suggest that planetary health-focused approaches to planning need to bring together multiple actors from diverse institutions to co-plan for positive change in a way that is problem-solving orientated, transdisciplinary. New developments in planning strategies should be underpinned by a recognition of the significance of all contributions made by the different institutions in an overarching conceptualisation of what constitutes progress in health that transcends individual institutional aims and values (Jowell et al. 2017, Watts et al., 2015). For example, Davern et al., (2017) uses evidence from the South Australian Government's design of public green spaces in denser cities to suggest that planetary health-focused approaches to planning need to involve inter-institutional co-planning for positive change.

4.2.2.6 Suggestions from Planetary Health for improving planning strategies at the design and action implementation stage

Fifteen out of the 20 articles (Barthol et al., 2010, Bellamy et al., 2017, Emmanuel and Steemers 2018, Giridharan et al., 2004, Holmes et al., 2015, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Mirzaei 2015, Ng et al., 2012, Perini and Magliocco 2014, Ren et al. 2013, Speak et al. 2012, Shi et al., 2018, Tan et al., 2016) within the Planetary Health category offer suggestions for improving planning strategy development at the design and action implementation stage:

a. Introduce diverse ecosystems through the design of green space and wildlife gardens (Barthel et al., 2010, Bellamy et al., 2017, Emmanuel and Steemers 2018, Kleerekoper et al., 2012, Ng et al., 2012, Ren et al. 2013, Tan et al., 2016)

Seven out of the fifteen articles offering suggestions from a Planetary Health perspective discuss how planners can promote both human and environmental health through introducing diverse ecosystems, providing access to nature, and through the design of green space and wildlife gardens (Barthel et al., 2010, Bellamy et al., 2017, Emmanuel and Steemers 2018, Kleerekoper et al., 2012, Ng et al., 2012, Ren et al. 2013, Tan et al., 2016). For example, Bellamy et al. (2017) highlights that tree species for park environments need to be selected, not just to enhance

the appeal of the space for residents in high density neighbourhoods, but to enhance the biodiversity of the wider ecosystem and to provide planet cooling benefits. Emmanuel and Steemers (2018), Kleerekoper et al., (2012), Ng et al., (2012), and Tan et al., (2016) examine how different implementations of greenery may help to mitigate the urban heat island effect in high density urban environments.

b. Implement sustainable energy sources (Emmanuel and Steemers 2018, Mirzaei 2015, Ren et al., 2013, and Shi et al., 2018)

Four articles (Emmanuel and Steemers 2018, Mirzaei 2015, Ren et al., 2013, and Shi et al., 2018) discuss how tall, high-rise buildings present a great opportunity for implementing sustainable energy sources, such as solar power, to enhance environmental health, upon which human health depends.

c. Use urban climate knowledge to provide visual and spatial understanding of the importance of green space in the design of the built environment (Ren et al., 2013)

One article out of the fifteen that offer suggestions for improving planning strategies from a Planetary Health perspective suggests that urban climate knowledge can be promoted in higher density planning to improve the extent to which development can enhance human and environmental health for future generations by highlighting visually and spatially the critical importance of urban greenery and coverage, urban air paths, open spaces, water bodies and rivers, and building morphology for enhancing both human and environmental health (Ren et al., 2013).

d. Improve air quality and temperature, and also disperse pollution through innovation in building design (Giridharan et al., 2004, Holmes et al., 2015, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Perini and Magliocco 2014, Shi et al., 2018)

Seven articles within the sample focuses on how building morphology in higher density settings can improve environmental health by enhancing pollution dispersion to reduce its concentration for improving air quality (Giridharan et al., 2004, Holmes et al., 2015, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Perini and Magliocco 2014, Shi et al., 2018). In turn, this helps to improve both environmental health and human health. Six of these seven articles also examine how building morphology, including height and variation, can be used to decrease ambient air temperatures, which in turn, can help to combat the causes of urban Heat Island Effect rather than to simply mitigate its effects on human health (Giridharan et al., 2004, Holmes et al., 2015, Kleerekoper et al., 2012, Lee and Braham 2017, Lee et al., 2015, Perini and Magliocco 2014).

4.2.3 Comparative analysis of suggestions for improving existing planning strategies for healthy higher density living

The similarities and differences between the suggestions made by each of the three theoretical perspectives of health can be summarised and illustrated in a table format for both the bureaucratic and for the design and action-invention stages of planning strategy development.

Tables 8 and 9 present of the similarities and differences of these suggestions. Table 8 summarises the similarities and differences for the bureaucratic level suggestions, while Table 9 compares the similarities and differences for the design and action-implementation suggestions for planning strategy development. The following sub-sections present the tables and a discussion of the similarities and differences outlined above.

4.2.3.1: Comparing suggestions at the bureaucratic level

Table 8 summarises the similarities and differences for the bureaucratic level:

Table 8: Similarities and differences between the suggestions for improving existing planning strategies at the bureaucratic level made by each of the three theoretical perspectives of health

	Suggestions for improving planning strategies at the Bureaucratic Level of Planning Strategy Development			
		Global Public Health	**Socio-Ecological Determinants of Health**	**Planetary Health (Relational Ecological Approaches)**
Suggestions at the Bureaucratic Level for Inclusion in the Following Aspects of Planning Strategy Development: • **Legislation,** • **Policies,** • **Plans,** • **Guidelines,** • **Tools.**	**Scale of Approach**			
	Multi-levelled, multi-scaled approach	✓	✓	✓
	Greater consider of how international political and economic factors affect local health	✓		
	Greater focus on how local social and economic factors that affect health in through a combined Global to Local level Approach	✓		
	Focus on community health and quality of life rather than individual health		✓	
	Institutional Involvement			
	Adopt a transdisciplinary approach to the development of new planning strategies	✓	✓	✓
	More cross-sectoral partnerships in planning strategy developments	✓	✓	✓

Suggestions for improving planning strategies at the Bureaucratic Level of Planning Strategy Development

		Global Public Health	Socio-Ecological Determinants of Health	Planetary Health (Relational Ecological Approaches)
Suggestions at the Bureaucratic Level for Inclusion in the Following Aspects of Planning Strategy Development: • **Legislation,** • **Policies,** • **Plans,** • **Guidelines,** • **Tools.**	Incorporate multiple actors from diverse institutions in collaborations		✓	✓
	Utilise existing checklists to encourage successful collaboration processes		✓	
	Strengthen individual capacities of institutions to enable better resourced collaborations		✓	
	Encourage greater awareness and sense of a shared responsibility between institutions for shaping health outcomes		✓	
	Co-learning approaches for planners and health professionals		✓	✓
	Use of Evidence			
	Move from randomised control evidence to greater governance for health	✓	✓	✓
	Draw on subjective as well as objective health evidence and perceptions of health		✓	

Suggestions for improving planning strategies at the Bureaucratic Level of Planning Strategy Development

		Global Public Health	Socio-Ecological Determinants of Health	Planetary Health (Relational Ecological Approaches)
Suggestions at the Bureaucratic Level for Inclusion in the Following Aspects of Planning Strategy Development: • **Legislation,** • **Policies,** • **Plans,** • **Guidelines,** • **Tools.**	Show greater awareness of how human behaviour affects outcomes		✓	
	Temporality of Approach			
	Adopt a long term outlook	✓		✓
	Adopt a distant long-term future outlook			✓
	Conceptualisation of the relationship between society and the built environment			
	Greater focus on the relationship between the built environment and social factors for influencing health-related behaviour		✓	
	Show greater awareness of the inter-relationships between the different determinants		✓	
	Conceptualisation of the relationship between the social and natural environment			
	Consideration of the role that the health of the natural environment plays in supporting human wellbeing in decision-making			✓

Suggestions for improving planning strategies at the Bureaucratic Level of Planning Strategy Development				
		Global Public Health	**Socio-Ecological Determinants of Health**	**Planetary Health (Relational Ecological Approaches)**
Suggestions at the Bureaucratic Level for Inclusion in the Following Aspects of Planning Strategy Development: • **Legislation,** • **Policies,** • **Plans,** • **Guidelines,** • **Tools.**	Rethink relationship between health and environment in terms of multi-dimensional feedback loops			✓
	Consider the significance of anthropogenic climate change in approaches to planning development			✓
	Focus of making change through planning strategies			
	Greater focus on improving health equity		✓	
	Challenge culturally embedded barriers to positive health outcomes	✓		
	Encourage greater use of active and public transport	✓		
	Enhance environmental sustainability			✓

Discussion of Similarities and Differences

Articles grouped within each of the different theoretical perspectives of health all offer a range of suggestions for improving planning strategies at the bureaucratic level. Each of the three perspectives are also similar in so far as the suggestions pertain to several identifiable themes. These are:

- Scale of approach in planning strategy development
- Institutional involvement
- Use of health evidence
- Temporal focus
- Focus of making social change through planning policy and practice
- Conceptualisation of the relationship between society and the built environment
- Conceptualisation of the relationship between the social and natural environment

However, subtle differences between how articles grouped within each different theoretical perspective approach each of these themes can be identified within the literature sample. These are discussed in turn below:

- Suggestions targeted at the scale of approach to planning strategy development

All three perspectives offer suggestions that involve making changes in terms of the scale of approach that planning strategies should focus on improving. All three perspectives emphasise the need to adopt a multi-levelled, multi-scaled approach (see Grant et al., 2017 (Global Health), Gunn et al., 2017 (Socio-Ecological Determinants), Pattanayak and Haines 2017 (Planetary Health) for an example of each). However, the Global Health perspective emphasises that this should involve greater consider of how international political and economic factors affect global health and a greater focus on how local social and economic factors that affect health in through a combined Global-to-Local level approach (Giles-Corti et al., 2012, 2016, Grant et al., 2017, Hanlon et al., 2012, Wells et al., 2010, King et al., 2018). This contrast with the Socio-Ecological determinants perspective, which places stronger emphasis on the need to pay greater attention to the role on community health and quality of life rather than focusing on individual health outcomes (Anderson 2009, Badland et al., 2017, Gifford 2007, Gunn et al., 2017, Haarhoff et al., 2016, Lowe et al., 2015).

- Institutional Involvement

All three perspectives make suggestions that involve the institutional involvement in planning strategy development. Significantly, all three perspective emphasise the need to adopt a transdisciplinary approach to the development of new planning strategies and more cross-sectoral partnerships in planning strategy developments. However, only the Socio-Ecological Determinants and the Planetary Health perspective emphasise the need to incorporate multiple actors from diverse institutions in collaborations and to develop co-learning opportunities for planning and health professionals (Haigh et al., 2011, Speak 2012, Pattanayak and Haines 2017). The Socio-Ecological Determinants perspective also stresses the importance of other factors that should be improved when thinking about institutional involvement when developing new approaches to planning. These are to incorporate multiple actors from diverse institutions in collaborations, including community members and voluntary organisations (Fincher 2004, Hancock 2017, Kent 2015), as well to use existing checklists to encourage successful collaboration processes and to focus on strengthening the individual capacities of institutions to enable better

resourced collaborations to be formed (Barton 2006, Haigh et al., 2011, Thompson and Paine 2017). Articles embedded upon this theoretical perspective also suggest a need to encourage the development of a greater sense of shared responsibility between institutions for shaping health outcomes (Giles-Corti et al., 2014, Randolph 2006).

- Use of Health Evidence

Articles grouped within all three theoretical perspectives of health suggest a move away from randomised control evidence to greater governance for health in planning strategy development (Easthope and Judd 2010, Foster 2006). However, only the Socio-Ecological Determinants perspective suggests drawing on subjective as well as objective health evidence and perceptions of health (Foster 2006, Lofti and Koohsari 2009, Easthope and Judd 2010), as well as showing greater awareness of how human behaviour affects outcomes will improve existing approaches to planning strategy development (Buys and Miller 2012, Giles et al., 2014)

- Temporal focus

Only the Global Health and Planetary Health articles make suggestions that involve making changes to reconsidering the temporality of approach when developing planning strategies. The Global Health perspective and Planetary Health perspective both emphasise the need to take a long-term perspective, however only the Planetary Health perspectives discusses the need to adopt a distant future-orientated perspective that involves thinking about potential health outcomes that goes beyond thinking in terms of the next three generations (Barthol et al., 2010, Jowell et al., 2017).

- Focus of making change through planning strategies

Two out of three perspectives include suggestions for planning strategies that involve rethinking about the focus of making change through planning strategies. The Socio-Ecological Determinants approach suggests a greater focus needs to be given to improving health equity (Allen and Blandy 2004, Johnson-Lawrence et al., 2015), challenging culturally embedded barriers to positive health outcomes (Giles-Corti et al., 2014, Haigh et al., 2011, Randolph 2006), and encouraging greater use of active and public transport (Newman et al., 2015). However, the Planetary Health perspective instead emphasises the need to enhance environmental sustainability through the development of planning strategies at the bureaucratic level (Davern et al., 2017, Jowell et al., 2017).

- Conceptualisation of the relationship between society and the built environment

Only the Socio-Ecological Determinants perspective emphasises the need for planners to rethink the conceptualisation of the relationship between society and the built environment when developing planning strategies. According to the articles within this theoretical group, greater focus on the relationship between the built environment and social factors for influencing health-related behaviour (Duff 2012, Kent and Thompson 2014), and greater awareness of the inter-relationships between the different determinants should be reflected in new planning strategy developments (Barton 2006, Haigh et al., 2011).

- Conceptualisation of the relationship between the social and natural environment

In contrast to the articles within the Socio-Ecological Determinants perspective, only the Planetary Health perspective emphasises the need to rethink the relationship between the social and natural environments in planning

strategy development processes to ensure positive long-term health outcomes (Bellamy et al., 2017, Davern et al., 2017). Articles within this category argue that this can be achieved through consideration of the role that the health of the natural environment plays in supporting human wellbeing in decision-making, rethinking the relationship between health and environment in terms of multi-dimensional feedback loops (Jowell et al., 2017, Watts et al., 2015), and considering the significance of anthropogenic climate change in approaches to planning development (Davern et al., 2017, Jowell et al., 2017, Watts et al., 2015).

4.2.3.2 Comparing suggestions at the design and action-intervention level

Table 9 summarises the similarities and differences for the design and action-intervention level

Table 9: Similarities and differences between the suggestions for improving existing planning strategies at the design and action-intervention level from each of the three theoretical perspectives of health

Suggestions for improving planning strategies at the Design and Action-Intervention Level of Planning Strategy Development				
		Global Public Health	**Socio-Ecological Determinants of Health**	**Planetary Health (Relational Ecological Approaches)**
Specific Suggestions at the Design and Action-Implementation Level for Inclusion in Planning Strategy Developments	Consider the role of how the built environment overlaps with social factors in planning design	✓	✓	✓
	Implement factors and evidence relating quality of life into planning design	✓	✓	✓
	Build 'up' rather than 'out'	✓	✓	✓
	Building design should reflect changing demographic profile of local area	✓	✓	
	Design and implementation of public spaces, transport networks, street networks and mixed land use	✓	✓	
	Limit car use through street design		✓	
	Involve residents in place-making and planning decision making		✓	
	Use existing toolkits to embed attributes evidenced to improve health outcomes		✓	
	Implement minimum standards for indoor space		✓	
	Reduce existing health inequalities (gender and socio-economic) through building design		✓	
	Obtain and use evidence specific to national and local context		✓	
	Enhance social interaction through design of the built environment		✓	
	Provide ongoing building maintenance		✓	
	Provide facilities for access to healthy food		✓	
	Use conceptual mapping to identify barriers to healthy living		✓	
	Improve air quality to disperse pollution and combat problems associated with extreme heat		✓	✓
	Introduce diverse ecosystems			✓
	Use sustainable energy sources			✓
	Apply urban climate knowledge to develop green space			✓

Discussion of Similarities and Differences

Articles grouped within each of the different theoretical perspectives of health all offer a range of suggestions for improving planning strategies at the design and action-implementation level.

Articles grouped within all three theoretical perspectives of health overlap in terms of highlighting the need for planning professionals to consider the role of how the built environment overlaps with social factors in planning design, implement factors and evidence relating quality of life into planning design, and build 'up' rather than 'out' in the style of building design (Badland et al., 2015, Barthol et al., 2010, Bellamy et al., 2017, Easthope and Judd 2010, Giles-Corti et al., 2012, Haarhoff et al., 2016). However, there is considerably little overlap in terms of the other suggestions made for inclusion at the design and action-implementation level. This is likely to be reflective of the different priorities for health emphasised by each of the three different perspectives, with the Global Health perspective emphasising the need to prioritise demographic change, the Socio-Ecological Determinants of Health perspective placing greater emphasis on improving health equity through planning, and the Planetary Health perspective's concern with improving the health of the natural environment to promote human flourishing in the longer term.

However, despite these different priorities, the Global Health and the Socio-Ecological Determinants of Health perspectives overlap in their agreement on how building design should reflect changing demographic profile of local area, and the need to design and implement efficient public spaces, transport networks, street networks and mixed land use to promote positive health outcomes through planning strategies (Badland et al., 2015, Easthope and Judd 2010, Giles-Corti et al., 2012, Kent 2015, Kent and Thompson 2014, King et al., 2018, Haarhoff et al., 2016, Hancock 2017, Holiday 2006, Quigley and Ball 2007). The Socio-Ecological Determinants perspective concern with health equity is reflected in their extensive suggestions for improving planning strategies through emphasis on limiting car use through street design (Bramley et al., 2006, Kent and Thompson 2014, involving residents in place-making and planning decision making (Haarhoff et al., 2016, Lyons 2007), using existing toolkits to embed attributes evidenced to improve health outcomes (Diez-Roux and Mair 2010, Haarhoff et al., ibid), and implementing minimum standards for indoor space. Articles grouped within this perspective are the only ones to suggest how these may improve health outcomes.

In addition, the Socio-Ecological Determinants perspective is the only one to focus on reducing existing gender and socio-economic health inequalities through building design (Giles-Corti et al., 2014, Sherry and Easthope 2016), suggest a greater need to obtain and use evidence specific to national and local context (Thompson and Paine 2017), enhance social interaction through design of the built environment (Kalcheva et al., 2015), provide ongoing building maintenance and facilities for access to healthy food (Sharp 2003, Thompson and Paine 2017), and to suggest the use of conceptual mapping tools to identify barriers to healthy living (Badland et al., 2017).

Articles grouped within the Planetary Health perspective and the Socio-Ecological Determinants of Health perspective both highlight a need to improve air quality to disperse pollution through building design (Giridharan et al., 2004, Hu et al., 2016, Holmes et al., 2015, Lee and Braham 2017, Lee et al., 2015, Mirzaei 2015, Perini and Magliocco 2014, Shi et al., 2018, Tan et al., 2016). However, their reasons for making this suggestion diverge in

that the Planetary Health perspective is more focused upon the environmental outcomes as well as the human health outcomes of this type of intervention, compared to the Socio-Ecological Determinants of Health perspective. The Planetary Health perspective's greater concern with improving environmental health for improving human health is also reflected in its suggestions to introduce diverse ecosystems (Barthol et al., 2010, Bellamy et al., 2017, Kleerekoper et al., 2012, Ng et al., 2012, Ren et al., 2013), use sustainable energy sources (Ren et al., ibid, Shi et al., 2018), and to apply urban climate knowledge to develop green space, through planning design and intervention (Emmanuel and Steemers 2018, Shi et al., 2018, Tan et al., 2016). Articles grouped within this perspective are the only ones to place this significant emphasis on strategies designed to improve environmental health in terms of a co-benefits approach to improving environmental and human health.

4.3 Recommendations

The following recommendations can be made based on the evidence from the literature identified and discussed above:

To examine how existing understandings and conceptualisations of health are embedded within current New South Wales planning strategies by looking at how health evidence has previously been incorporated into bureaucratic strategies. This can be undertaken by looking at how health has been incorporated into legislation, policies, plans, guidelines and tools, in order to define the baseline from which to develop and implement new strategies and approaches.

1. To examine how existing understandings and perspectives of health are currently utilised in design and action-orientated planning strategies including land use policies, building controls, standards for green space, open spaces, infrastructure related to transport, energy, water and education, design techniques, site selection, building design, built environment features, and resident engagement in place-making activities. This will provide a second component of the baseline data required from which to evaluate the implementation of new strategies and approaches.

2. Drawing upon the recommendations outlined in the literature and the evaluation of existing strategies, develop an approach to improving existing planning strategy development for improving health outcomes through development of a new approach that brings together the suggestions raised for each of the different theoretical perspectives of health into a unified framework embedded upon a unified conceptualisation of health.

3. Conduct interviews and focus group interviews with a range of planning professionals to develop an understanding of the limitations of current approaches to planning strategy development in a practical context and to tailor the development of a new approach to planning strategy development in a way that best aligns with the needs of current planning professionals.

4. To focus on developing the new approach by working from existing areas of overlap between the different perspectives of health to identify and define key areas of intervention at the bureaucratic level, including: scale of approach, institutional involvement, use of evidence, temporality of approach, conceptualisation of relationship between society and the built environment and conceptualisation of the relationship between society and the wider natural environment.

5. Align the different suggestions for improving the design and action-intervention strategies emphasised by each of the different theoretical approaches to health within a holistic intervention framework that unifies the different priorities of health for planning for healthy higher density living.

6. Design and develop the new approach through working together with a wide range of planning and health professionals and academics from a range of disciplines to develop and implement a co-learning approach to problem solving.

7. Implement the suggestions comprising the new approach to strategy development at both the bureaucratic and design and action-intervention level.

8. Test the applicability individual strategies within the new approach and refine accordingly;

9. Develop a framework for measuring and evaluating the success of particular strategy developments, drawing on information in the literature about the significance of developing new ways to evaluate subjective as well as objective forms of health evidence;

10. Identify barriers to implementing the approaches and suggestions for improving strategy developments and work with planning and health professionals and academics from different disciplines to suggest creative ways to overcome challenges.

4.4 Actions

The following actions will be undertaken in light of these recommendations:

- Conduct a review and analysis of existing planning documents pertaining to current planning strategies in the new South Wales to explore how health has been incorporated into existing legislation, policies, plans, guidelines and tools, for higher density living to identify limitations of existing approaches at the bureaucratic level
- Repeat the review and analysis for existing design and action-intervention strategies
- Work with academics from a range of disciplines to align suggestions for improving planning strategy development into a cohesive approach that draws together the different perspectives on health to improve health for higher density living
- Identify opportunities and approach for the implementation of a planning strategy development
- Explore technologies and processes based on their disciplinary expertise that can be brought to the new healthy planning strategies to realise them in real-life
- Involve undergraduate and postgraduate students in the testing and refinement of new strategies as part of education-focused, transdisciplinary approach to challenging existing assumptions about health and the use of health evidence in planning practices by working with the coordinators of various undergraduate and postgraduate degree programmes across the three Universities in planning, architecture, public health, urban planning and environment and sustainability.
- Seek to involve TAFE construction students in the testing and implementation stage by working with the Landcom education outreach officer and identifying specific courses that that the project activities can align with, for example design and construction.
- Consult and meet with representatives from a project reference group that includes key government and industry stakeholders involved to seek their involvement and expertise in the development of new planning strategies and approaches to strategy development, including Local Health Districts, and the NSW Department of Planning and Environment.
- Identify new opportunities for disseminating new strategies within the wider Australian and international context through a variety of communication strategies, including presentations at national and international conferences, appropriate media outlets and through the publication of academic articles.

5. Conclusion

This literature review was undertaken as the first stage of the *Healthy Higher Density: Translating Evidence to Support Planning Strategies for Healthier Higher Density Living* research project which aims to: a) provide an understanding of how health evidence can be used to plan higher density precinct developments to enhance population health, and b) develop planning strategies to apply health evidence within planning for higher density development.

This first half of this review (section 3) has provided an overview of how the existing academic literature defines, understands and conceptualises: 1) higher density living environments, and 2) what constitutes a healthy higher density living environments according on different theoretical approaches to health. The second half of the review (section 4) has provided a detailed overview of the different suggestions from the academic literature for improving health through developments in planning strategies at the bureaucratic level and at the design and action-implementation level. The review reveals how the suggestions made for improving approaches to planning strategy development and implementation vary depending upon the theoretical perspective of health that each article is embedded upon. The recommendations and points for action developed from the findings of this review contribute to the development of phase two of the Healthy Higher Density research project, wherein the project will develop and implement a framework designed to evaluate the long-term impacts of healthy planning strategies in two high density developments in two case study sites in Sydney, New South Wales, Australia.

5.1 Utilising the findings to develop phase two of the Healthy Higher Density research project

Embedded within the research question, 'What is meant by healthy higher density living?', are two underlying questions: 1) What is meant by the term high density living? and 2) How is health conceptualised in relation to higher density living? The findings of the literature review reveal that the majority of the literature within the sample does not provide a comprehensive definition of density, but does provide both qualitative and quantitative descriptors and components that are characteristic of high-density environments and which influence health outcomes. While only one article provides an exact definition of what constitutes a healthy higher density living environment, the other articles present and discuss the different factors that influence health in a higher density context. Taken together, these factors provide an overview of how health outcomes are determined in the higher density context and what specific factors or attributes of the built environment can help to determine both positive and negative health outcomes. The determining factors of health and characteristics of a healthy higher density environment emphasised by each particular article varies, depending on the theoretical approach to health that an article is framed upon. The findings reveal that the academic research is underpinned by three broadly defined theoretical approaches to health: 1) a Global Public Health perspective, 2) a Socio-Ecological Determinants of Health perspective, and 3) a Planetary Health or relational ecological perspective. Answers to the question 'How can planning strategies support healthy higher density living?' also depend upon the specific approach to health framing each study, as each theoretical approach leads to an emphasis upon differing, yet overlapping, ideas and practices for improving approaches to planning strategy development for improving health outcomes. The broader theoretical approach also influences what specific, direct actions and implementations professionals involved in planning can take, both the bureaucratic and action-implementation level, to generate the conditions associated with the different interpretations of what constitutes a healthy higher density living environment.

The vast majority of the literature in the sample is underpinned by a Socio-Ecological Determinants of Health approach, with a smaller number of studies drawing upon a Global Public Health approach. A small number of recently published articles are embedded within Planetary Health approach, characterised by a relational ecological conceptualisation of health. This perspective contained the smallest number of articles found within the sample. The academic journal disciplinary focus for each of the published articles reveal the absence of a consensus over defining health in relation to high density within each of the particular disciplines, as well as across the different disciplines. The comparative analysis and discussion of the articles within the sample show the similarities and differences in approaches to conceptualising what factors and attributes constitute a healthy higher density living environment across each of the theoretical approaches. Articles drawing on a Global Public Health approach for defining health in a higher density context conceptualise health in terms of wider global challenges that influence population health at the local level. Socio-Ecological Determinants of Health approaches emphasise a wide variety of social and environmental factors that influence, both directly and indirectly, health outcomes. The majority of studies acknowledge that these inter-relating factors have an indirect influence health by promoting the conditions that can lead to particular behaviours that improve health outcomes. Articles focusing on Planetary Health emphasise a focus on the natural environment for ensuring the sustainability of human health in the longer-term.

The evidence contained in this literature review also shows how conceptualisations of health lead to differences in terms of thinking about the following suggestions for improving existing approaches to planning strategy development: scale of action, forms of evidence, focus of challenges, institutional involvement, the relationship between health and the built environment, and the relationship between human health and the health of the natural environment. The Global Public Health approach emphasises a multi-scaled global to local approach for improving health,

while studies categorised within the Social-Ecological Determinants of Health approach focus more on emphasising interventions within the context of specific local neighbourhood developments. The Planetary Health perspective emphasises the need for a multi-scaled transformative approach wherein higher density living presents an opportunity, rather than a challenge, for improving the health of the planet. This would require a transformative approach to governance and planning for health that would place substantial emphasis on both global and local transformative approaches.

The recommendations made within this review for development during phase two of the *Healthy Higher Density* research project are based on the findings of the evidence presented within this review in relation with the project aims to develop and implement a framework designed to evaluate the long-term impacts of healthy planning strategies in two higher density developments. Recommendations include developing a definition of higher density that align the existing quantitative and qualitative descriptors and attributes associated with higher density urban environments, and developing the definition to include specific descriptors of the health of the natural environment within the context of a higher density living environment. Other recommendations are to create a standard definition of health that unifies and aligns the priorities of each of the three theoretical approaches of health, and to develop a conceptual framework of health that illustrates all the different factors, attributes and interactions between them associated with health, as suggested by each of the different theoretical perspectives. A list of recommendations for implementing the range of suggestions as to how planning strategies may be developed to improve health outcomes within a higher density context in a practical, real-world context are also discussed in this report, including the suggestion to develop a framework for measuring and evaluating particular strategy developments by drawing upon subjective as well as objective forms of health evidence. Lists of points for action to develop each of the recommendations are included in the review. Development of each of the recommendations into actions should not only help to develop new understandings of how health evidence can be effectively translated into planning strategies for higher density precinct development, but will also help to create a collaborative inter-institutional, action-oriented transdisciplinary learning partnership between researchers from a wide range of disciplines and diverse institutions with interests in supporting innovation in healthy planning policies and practices for higher density precinct developments.

This review of the literature highlights the key opportunities for drawing together the three main theoretical perspectives of health in developing new approaches to planning strategy development for healthy higher density living within phase two of the Healthy Higher Density research project. It also showcases the range of suggestions that phase two of the project can draw on to evaluate current planning approaches, policy and practice in the two case study sites in Sydney, New South Wales.

5.2 Limitations of the review

The focus of this literature review was restricted to reviewing and analysing a sample of the existing published academic literature from a wide range of academic disciplinary and multidisciplinary journals including journals pertaining Public Health, Urban Planning, Sociology, Architecture, Human Geography, Cultural Studies, and Engineering. As a result, Government, third sector and industry reports focusing on health in relation to higher density living were not included within the parameters of the review. In addition, the particular evidence discussed within many of the academic articles focuses on specific regional and local settings, the majority of which lie outwith Australia. Given that the number of articles referring specifically to the Australian context are rather limited, it can be said that this indicates a need to review the range of health evidence available pertaining to the Australian context in order to obtain information about the existing public health challenges that are particular to the New South Wales context. Access to this information would enable the development of a set of aims relating to improving specific health outcomes through the implementation phase of the project to be determined. The evidence presented in this review highlights the significance of national and local contexts in planning for fostering healthy higher density living environments. Therefore, reviewing the contextual literature and evidence is necessary for obtaining information about specific contextual factors that will be necessary for consideration in evaluating and developing approaches to healthy planning in the New South Wales context.

6. References

Acioly, C., and Davidson, F., 1996, "*Habitat II.- Density in Urban Development.*", Building Issues, vol. 3, no. 8, pp. 8-11

Allen, C. & Blandy, S. 2004. *The Future of City Centre Living: Implications for Urban Policy*, London: Department for Communities and Local Government

Anderson, B. 2009, *'Affective Atmospheres.', Emotion, Space and Society., vol. 2*, no. 2. pp. 77-81.

Astell-Burt, T., Feng, X.Q., Mavoa, S., Badland, H.M. & Giles-Corti, B. 2014, '*Do low-income neighbourhoods have the least green space? A cross-sectional study of Australia's most populous cities*', Bmc Public Health, vol. 14.

Badland, H., Foster, S., Bentley, R., Higgs, C., Roberts, R., Pettit, C. & Giles-Corti, B. 2017, '*Examining associations between area-level spatial measures of housing with selected health and wellbeing behaviours and outcomes in an urban context*', Health & Place, vol. 43, pp. 17-24.

Badland, H., White, M., MacAulay, G., Eagleson, S., Mavoa, S., Pettit, C. & Giles-Corti, B. 2013, '*Using simple agent-based modeling to inform and enhance neighborhood walkability*', International Journal of Health Geographics, vol. 12.

Badland, H. M., P. Donovan, S. Mavoa, M. Oliver, M. Chaudhury, and K. Witten. 2015. "*Assessing Neighbourhood Destination Access for Children: Development of the NDAI-C Audit Tool.*" Environment and Planning B: Planning and Design, Vol. 42.

Barthel, S., Folke, C. & Colding, J. 2010, '*Social–ecological memory in urban gardens—Retaining the capacity for management of ecosystem services*', Global Environmental Change, vol. 20, no. 2, pp. 255-65.

Barton, H., 2009. '*Land use planning and health and wellbeing*'. Land use policy, vol. 26 (Suppl), S115–S123.

Barton, H., 2015, '*Planning for Health and Well-Being: The time for Action*', in Barton, H., Thompson, S., Burgess, S. and Grant, M., (Eds.) The Routledge Handbook of Planning for Health and Well-Being: Shaping a sustainable and healthy future, Taylor and Francis, E-Book, Accessed 27/03/2018

Bellamy, C.C., van der Jagt, A.P.N., Barbour, S. & Smith, M. 2017, '*A Spatial Framework for Targeting Urban Planning for Pollinators and People with Local Stakeholders: A Route to Healthy, Blossoming Communities?*', Environmental Research, vol. 158, pp. 255-68

Beer, A., and Faulkner, D. 2009, *21st century housing careers and Australia's housing future, AHURI Final Report No. 128, Australian Housing and Urban Research Institute Limited*, Melbourne, https://www.ahuri.edu.au/research/final-reports/128

Bunker, R. and Holloway, D. 2007, "*How far and in what way is Sydney's new Metropolitan strategy likely to be implemented?*" Australian Planner, Vol. 44, no 1, pp. 26-33

Bryman, A. 2012, *Social Research Methods*, Oxford University Press, United Kingdom

Bunker, R., Gleeson, B., Holloway, D and Randolph, B., 2002, *The Local Impacts of Urban Consolidation, Urban Policy and Research*, vol. 20, no. 2, pp. 143–167.

Buys, L. & Miller, E. 2012, '*Residential satisfaction in inner urban higher-density Brisbane, Australia: role of dwelling design, neighbourhood and neighbours*', Journal of Environmental Planning and Management, vol. 55, no. 3, pp. 319-38.

Carmona, M., 2014, *The Place-shaping Continuum: A Theory of Urban Design Process*, Journal of Urban Design, vol. 19, no. 1, pp. 2-36,

Chan, E., & Lee, G. 2008. '*Critical factors for improving social sustainability of urban renewal projects*', Social Indicators Research, vol. 85, pp. 243-256.

Chan, I. Y. S., & Lui, A. M. M., 2018, '*Effects of neighbourhood on building design, height, greenspace, and cleanliness on indoor environment and health of building occupants*', Building and Environment, vol. 145, pp. 213-222.

Cho, I.S., Trivic, Z. & Nasution, I. 2017, '*New high-density intensified housing developments in Asia: qualities, potential and challenges*', Journal of Urban Design, vol. 22, no. 5, pp. 613-36

Christian, H., Ball, S.J., Zubrick, S.R., Brinkman, S., Turrell, G., Boruff, B. & Foster, S. 2017, '*Relationship between the neighbourhood built environment and early child development*', Health and Place, vol. 48, pp. 90-101.

Costello, E.J., Egger, H.L. & Angold, A. 2005, '*The developmental epidemiology of anxiety disorders: phenomenology, prevalence, and comorbidity*', Child Adolesc Psychiatr Clin N Am, vol. 14, no. 4, pp. 631-48, vii.

Cowie, C.T., Ding, D., Rolfe, M.I., Mayne, D.J., Jalaludin, B., Bauman, A. & Morgan, G.G. 2016, '*Neighbourhood walkability, road density and socio-economic status in Sydney, Australia*', Environmental Health, vol. 15.

Crommelin, L.a., Easthope, H. & Troy, L. 2017, *Equitable Density: The Place for Lower Income and Disadvantaged Households in a Dense City: Report 2*, The Neighbourhood Scale, University of New South Wales, Sydney, City Futures Research Centre, UNSW Built Environment for Shelter NSW Department of Family and Community Services

Davern, M., Farrar, A., Kendal, D. & Gunn, L. 2017, '*Higher-Density Cities Need Greening to Stay Healthy and Liveable*', The Conversation, May 5 2017

Diener, E., & Suh, E. 1997, '*Measuring quality of life: Economic, social and subjective indicators*'. Social Indicators Research, vol. 40, pp. 189–216.

Dodson, J. 2010, '*In the wrong place at the wrong time? Assessing some planning, transport and housing market limits to urban consolidation*'. Urban Policy and Research, vol. 28, pp. 497–504.

Duff, C. 2012, '*Exploring the role of 'Enabling Places' in promoting recovery from mental illness: A qualitative test of a relational model.*' Health and Place, vol. 18, no. 6, pp.1388–1395.

Easthope, H., and Judd, S., 2010. *Living well in greater density, Shelter NSW and City Futures*, Sydney.

Easthope, H. & Randolph, B. 2009, '*Governing the Compact City: The Challenges of Apartment Living in Sydney, Australia*', Housing Studies, vol. 24, no. 2, pp. 243-59.

Emmanuel, R., & Steemers, K., 2018, '*Connecting the realms of urban form, density and microclimate*', Building Research and Information, vol. 46, no. 8, pp.804-808.

Ewing, R., Meakins, G., Hamidi, S., & Nelson, A. C. 2007, '*Relationship between urban sprawl and physical activity, obesity, and morbidity—Update and refinement*'. Health and Place, vol. 26, pp. 118–126.

Ewing, R. & Rong, F. 2008, '*The impact of urban form on U.S. residential energy use*', Housing Policy Debate, vol. 19, no. 1, pp. 1-30.

Ewing R, Schmid T, Killingsworth R, Zlot A, Raudenbush S. 2003, '*Relationship between urban sprawl and physical activity, obesity and morbidity*'. Am J Health Promot, vol. 18, no. 1, pp. 47-57.

Falconer, R., & Richardson, E. 2010. '*Rethinking urban land use transport planning—opportunities for transit oriented development in Australian cities: case study Perth.*' Australian Planner, vol. 47, pp. 1–13.

Feng, J., Glass, T. A., Curriero, F. C., Stewart, W. F., Schwartz, B. S., 2010, '*The built environment and obesity: a systematic review of the epidemiologic evidence*', Health and Place, vol. 16, no. 2, pp. 175-190.

Feng X, Feng Z, Astell-Burt T. 2017, '*Perceived public transport infrastructure modifies the association between public transport use and mental health*'. PLoS ONE, vol. 12, no. 8: e0180081.

Fincher, R. 2004, '*Gender and Life Course in the Narratives of Melbourne's High-rise Housing Developers*', Australian Geographical Studies, vol. 42, no. 3, pp. 325-38.

Fitzgerald, D., Rose, N., Singh, I., 2016, '*Revitalizing sociology: Urban life and mental illness between history and the present*', British Journal of Sociology, vol. 67, no. 1, pp.138–160

Flood, J. 1997, '*Urban and Housing Indicators*', Urban Studies, vol. 34, no. 10, pp. 1635-65.

Forster, C. 2006, "*The Challenge of Change: Australian cities and urban planning in the new millennium*", Geographical Research, vol. 44, no. 2, pp.173-182.

Foster S, Wood L, Francis J, Knuiman M., 2015, '*Suspicious minds: Can features of the local neighbourhoods ease parents' fears about stranger danger?*' Journal of Environmental Psychology. Vol. 42, pp. 48-56

Forsyth, A., Oakes, M., Schmitz, K., Hearst, A., 2007. '*Does residential density increase walking and other physical activity?*' Urban Studies, vol. 44, pp. 679–697.

Gifford, R., 2007, '*The consequences of living in high-rise buildings*', Architectural Science Review, vol. 50, no. 1, pp.2-17

Giles-Corti, B.K.R., Dr Sarah Foster, 2012, *Increasing density in Australia: maximising the health benefits and minimising harm*, National Heart Foundation of Australia.

Giles-Corti, B., Badland, H., Mavoa, S., Turrell, G., Bull, F., Boruff, B., Pettit, C., Bauman, A., Hooper, P., Villaneuva, K., Astell-Burt, T., Feng, X., Learnihan, V., Davey, R., Grenfell, R. & Thackway, S. 2014, '*Reconnecting Urban Planning with Health: A Protocol for the Development and Validation of National Liveability Indicators Associated with Noncommunicable Disease Risk-Behaviours and Health Outcomes*', Public Health Research in Practice, vol. 25, no. 1.

Giles-Corti, B., Vernez-Moudon, A., Reis, R., Turrell, G., Dannenberg, A.L., Badland, H., Foster, S., Lowe, M., Sallis, J.F., Stevenson, M. & Owen, N. 2016, '*City Planning and Population Health: A Global Challenge*', The Lancet, vol. 388, no. 10, pp. 2912-24.

Giridharan, R., Genesan, S., & Lau, S. S. Y., 2004, '*Daytime urban heat island effect in high-rise and high-density residential environments in Hong Kong*', Energy and Buildings, vol. 36, pp. 525-234.

Giskes, K., van Lenthe, F., 2011, '*A systematic review of environmental factors and obesogenic dietary intakes among adults: are we getting closer to understanding obesogenic environments?*' Obesity Reviews, vol. 12, no. 5, e95-e106.

Gomez-Jacinto, L. & Hombrados-Mendieta, I. 2002, '*Multiple effects of community and household crowding*'. Journal of Environmental Psychology, vol. 22, pp. 233-246.

Grant, M., Brown, C., Caiaffa, W.T., Capon, A., Corburn, J., Coutts, C., Crespo, C.J., Ellis, G., Ferguson, G., Fudge, C., Hancock, T., Lawrence, R.J., Nieuwenhuijsen, M.J., Oni, T., Thompson, S., Wagenaar, C. & Ward Thompson, C. 2017, '*Cities and health: an evolving global conversation*', Cities & Health, vol. 1, no. 1, pp. 1-9.

Greenwald, M., Boarnet, M., 2001. '*Built Environment as Determinant of Walking Behavior: Analyzing Nonwork Pedestrian Travel in Portland, Oregon*', Transportation Research Record: Journal of the Transportation Research Board, vol. 1780

Gunn, L.D., Mavoa, S., Boulange, C., Hooper, P., Kavanagh, A. & Giles-Corti, B. 2017, '*Designing healthy communities: creating evidence on metrics for built environment features associated with walkable neighbourhood activity centres*', International Journal of Behavioral Nutrition and Physical Activity, vol. 14

Guo, F., Zhua, P., Wanga, S., Duana, D., Yun, J., 2017, '*Improving Natural Ventilation Performance in a High-Density Urban District: A Building Morphology Method*', Proceedings from the 10th International Symposium on Heating, Ventilation and Air Conditioning, 1922 October 2017, Procedia Engineering, vol. 205, pp. 952–958

Haarhoff, E., Beattie, L. & Dupuis, A. 2016, '*Does higher density housing enhance liveability? Case studies of housing intensification in Auckland*', Cogent Social Sciences, vol. 2, no. 1, p. 1243289.

Haigh, F., Ng Chok, H. & Harris, P. 2011, *Housing Density and Health: A Review of the Literature and Health Impact Assessments*, University of New South Wales, Sydney. , Centre for Health Equity Training, Research and Evaluation (CHETRE).

Hancock, T. 2017, '*Equity, sustainability and governance: key challenges facing 21st century cities (Part 1)*', Cities & Health, vol. 1, no. 1, pp. 95-9

Hanlon, P., Carlisle, S., Hannah, M., Lyon, A. & Reilly, D. 2012, '*A perspective on the future public health: an integrative and ecological framework*', Perspectives in Public Health, vol. 132, no. 6, pp. 313-9.

He, C., et al. 2011, *How important is the land use mix measure in understanding walking behaviour?* Results from the RESIDE study. Int J Behav Nutr Phys Activ. Vol. 8, pp. 55–5.

Healey, P., 2013, '*Circuits of knowledge and techniques: the translational flow of planning ideas and practice*', International Journal of Urban Regional Research, vol. 37, no. 5. pp. 1510-26.

Healey, P., 2011, '*The universal and the contingent: Some reflections on the transnational flow of planning ideas and practice*', Planning Theory, vol. 11, no. 2. pp. 188-207

Heath, G. B., Brownson, R. C., Kruger, J., Miles, R., Powell, K. E., Ramsey, L. T., and the Task Force on Community Preventive Service, 2006, '*The Effectiveness of Urban Design and Land Use and Transport Policies and Practices to Increase Physical Activity: A Systematic Review*', Journal of Physical Activity and Health, Vol. 3, Supplement 1, S55-S76

Holliday, S., 2006, '*Creating child friendly communities - challenges for the planning profession*. Creating Child Friendly Cities Conference, Sydney

Holman, N., Mace, A., Paccoud, A. & Sundaresan, J. 2015, '*Coordinating density; working through conviction, suspicion and pragmatism*', Progress in Planning, vol. 101, pp. 1-38

Holmes, S. H., Phillips, T., & Wilson, A., 2016, '*Overheating and passive habitability: indoor health and heat indices,*' Building Research and Information, vol. 44, no. 1, pp. 1-19.

Howley, P., Scott, M., 2009, '*Sustainability versus liveability: an investigation of neighbourhood satisfaction*', Journal of Environmental Planning and Management, vol. 52, no. 6, pp.847-864.

Hu, Y., White, M., & Ding, W., 2016, '*An urban form experiment on urban heat island effect in high density area*', Procedia Engineering, vol. 169, pp. 166-174.

Jabareen, Y.R. 2006, '*Sustainable Urban Forms: Their Typologies, Models, and Concepts*', Journal of Planning Education and Research, vol. 26, no. 1, pp. 38-52

Johnson-Lawrence, V., Schulz, A.J., Zenk, S.N., Israel, B.A. & Rowe, Z. 2015, '*Does territoriality modify the relationship between perceived neighborhood challenges and physical activity? A multilevel analysis*', Annals of epidemiology, vol. 25, no. 2, pp. 107-12

Jowell, A., Zhou, B. & Barry, M., '*The impact of megacities on health: preparing for a resilient future*', The Lancet Planetary Health, vol. 1, no. 5, pp. e176-e8

Kalcheva, E., Taki, A. & Hadi, Y. 2015, '*Sustainability high-rises in a sustainable development - the case of Salford Quays*', Procedia Social and Behavioural Sciences, vol. 216, pp. 960-73.

Kane, M. & Whitehead, J. 2018, '*How to ride transport disruption –a sustainable framework for future urban mobility*', Australian Planner, pp. 1-9.

Kaźmierczak, A. 2013, '*The contribution of local parks to neighbourhood social ties*', Landscape and Urban Planning, vol. 109, no. 1, pp. 31-44.

Kent, J.L. & Thompson, S. 2014, '*The Three Domains of Urban Planning for Health and Well-being*', Journal of Planning Literature, vol. 29, no. 3, pp. 239-56.

Kent, J. 2015, '*Higher-Density Living can make us healthier, but not on its own*', The Conversation, Jan 29 2015.

Kent, J.L., Ma, L. & Mulley, C. 2017, '*The objective and perceived built environment: What matters for happiness?*', Cities & Health, vol. 1, no. 1, pp. 59-71.

King, J. 2018, "*Air Pollution, Mental Health, and Implications for Urban Design: A Review*" Journal of Urban Design and Mental Health, Vol. 6, no. 6.

Kitahara, T. 2018, *Conserving the Walkable Environment in the Neighbourhood: A Case Study of the Improvement Effort in Kyojima*, Tokyo.

Kleerekoper, L., van Esch, M., & Salcedo, T. B., 2012, '*How to make a city climate-proof, addressing the urban heat island effect*', Resources, Conservation and Recycling, vol. 64, pp. 30-38.

Komossa, S. 2011. "*Researching and Designing GREAT; the Extremely Condensed Hybrid Urban Block.*" Architecture & Education Journal, vol. 5, pp. 27–36

Leal, C., Chaix, B., 2011, '*The influence of geographic life environments on cardiometabolic risk factors: a systematic review, a methodological assessment and a research agenda*', Obesity Reviews, vol. 12, no. 3, pp.217-230.

Lee, J. M., & Braham, W. W., 2017, '*Building emergy analysis of Manhattan: Density parameters for high-density and high-rise developments*', Ecological Modelling, vol. 363, pp. 157-171.

Lee, R. X., Jusuf, S. K., & Wong, N. H., 2015, '*The study of height variation on outdoor ventilation for Singapore's high-rise residential housing estates*', International Journal of Low-Carbon Technologies, vol. 10, pp. 15-33.

Lloyd, K., Fullagar, S. & Reid, S. 2016, '*Where is the 'Social' in Constructions of 'Liveability'? Exploring Community, Social Interaction and Social Cohesion in Changing Urban Environments*', Urban Policy and Research, vol. 34, no. 4, pp. 343-55.

Lotfabadi, P. 2014, '*High-rise buildings and environmental factors*', Renewable & Sustainable Energy Reviews, vol. 38, pp. 285-95.

Lotfi, S. & Koohsari, M.J. 2009, '*Analyzing Accessibility Dimension of Urban Quality of Life: Where Urban Designers Face Duality Between Subjective and Objective Reading of Place*', Social Indicators Research, vol. 94, no. 3, pp. 417-35.

Lowe, M., Whitzman, C., Badland, H., Davern, M., Aye, L., Hes, D., Butterworth, I. & Giles-Corti, B. 2015, '*Planning Healthy, Liveable and Sustainable Cities: How Can Indicators Inform Policy?*', Urban Policy and Research, vol. 33, no. 2, pp. 131-44.

Lu, Y.X., Yu Ye 2017, '*Urban density, diversity and design: Is more always better for walking? A study from Hong Kong*', Preventive Medicine, vol. Volume 103, Supplement, pp. S99-S103.

Lusher, L., Seaman, M. & Tsay, S.-P. 2008, *Streets to Live By: How Liveable Street Design can Bring Economic, Health and Quality of Life to New York City*, Transit.Org, New York

Marans, R.W., & Couper, M. 2000, '*Measuring the quality of community life: A program for longitudinal and comparative international research (vol. 2)*'. Proceedings of the 2nd International Conference on Quality of Life, Singapore

Matan, A., Newman, P., Trubka, R., Beattie, C. & Selvey, L.A. 2015, '*Health, Transport and Urban Planning: Quantifying the Links between Urban Assessment Models and Human Health*', Urban Policy and Research, vol. 33, no. 2, pp. 145-59

McCrea, R., & Walters, P. 2012, '*Impacts of urban consolidation on urban liveability: Comparing an inner and outer suburb in Brisbane, Australia*'. Housing, Theory and Society, Vol. 29, pp. 190– 206.

McMichael AJ, Neira M, Bertollini R, Campbell-Lendrum D, Hales S., 2009, '*Climate change: a time of need and opportunity for the health sector*'. The Lancet. Vol.9707, pp. 2123-5.

Mirzaei, P. A., 2015, '*Recent challenges in modelling of urban heat island*', Sustainable Cities and Society, vol. 19, pp. 200-206.

Moudon, A.V. & Lee, C. 2003, '*Walking and bicycling: an evaluation of environmental audit instruments*', Am J Health Promot, vol. 18, no. 1, pp. 21-37.

Ng, E., Chen, L., Want, Y., & Yuan, C., 2012, '*A study on the cooling effects of greening in a high-density city: An experience from Hong Kong*', Building and Environment, vol. 47, pp. 256-271.

Nicholls, L., McCann, H., Strengers, Y., & Bosomworth, K., 2017. *Electricity pricing, heatwaves and household vulnerability in Australia*. Melbourne: Centre for Urban Research, RMIT Australia.

Nissen, Sylke. 2008. '*Urban Transformation from Public and Private Space to Spaces of Hybrid Character.*' Czech Sociological Review, vol. 44, no. 6, pp. 1129–1149

Ormandy, D., & Ezratty, V., 2016, '*Thermal discomfort and health: protecting the susceptible from excess cold and excess heat in housing*', Advances in Building Energy Research, vol. 10, no. 1, pp. 84-98.

Paciência, I. & Moreira, A. 2017, '*Human health: is it who you are or where you live?*', The Lancet Planetary Health, vol. 1, no. 7, pp. e263-e4.

Pacione, M. 2003, '*Quality-of-life research in urban geography*'. Urban Geography, vol. 24, pp. 314–339.

Pattanayak SK, Haines A. 2017, '*Implementation of policies to protect planetary health*'. The Lancet Planetary Health. Vol. 1, no. 7: e255-e

Perini, K., Magliocco, A., 2014, '*Effects of vegetation, urban density, building height, and atmospheric conditions on local temperatures and thermal comfort*', Urban Forestry and Urban Greening, vol. 13, pp. 495-506.

Pomeroy, J. 2011, '*Defining Singapore Public Space: From Sanitization to Corporatization*', Journal of Urban Design, vol. 16, no. 03, pp. 381-9

Quastel, N., Moos, M., & Lynch, N. 2012, '*Sustainability-as-density and the return of the social: The case of Vancouver, British Columbia.*' Urban Geography, vol. 33, pp. 1055–108

Quigley, R., and Ball, J., 2007, *Wellbeing Assessment of the Draft Far North District Council Kerikeri-Waipapa Structure Plan*, Quigley and Watts Pty Ltd. Public Health Specialist.

Randolph, B. & Holloway, D. 2005, '*Social Disadvantage, Tenure and Location: An Analysis of Sydney and Melbourne*', Urban Policy and Research, vol. 23, no. 2, pp. 173-201.

Randolph, B. & Tice, A. 2013, '*Who Lives in Higher Density Housing? A Study of Spatially Discontinuous Housing Sub-markets in Sydney and Melbourne*', Urban Studies, vol. 50, no. 13, pp. 2661-81.

Redman, C. L. and N. S. Jones. 2005. '*The Environmental, Social, and Health Dimensions of Urban Expansion*'. Population and Environment, Vol. 26, no. 6, pp. 505-20

Reid, S., Lloyd, K. & O'Brien, W. 2017, '*Women's perspectives on liveability in vertical communities: a feminist materialist approach*', Australian Planner, vol. 54, no. 1, pp. 16-23.

Ren, C., Lau, K.L., Yiu, K.P. & Ng, E. 2013, '*The application of urban climatic mapping to the urban planning of high-density cities: The case of Kaohsiung, Taiwan*', Cities, vol. 31, pp. 1-16.

Roulet, C-A., Flourentzou, F., Foradini, F., Bluyssen, P., Cox, C., & Aizlewood, C., 2006, '*Multicriteria analysis of health, comfort and energy efficiency in buildings*', Building Research and Information, vol. 34, no. 5, pp. 475-482.

Sherry, C. & Easthope, H. 2016, '*Under-supply of schooling in the gentrified and regenerated inner city*', Cities, vol. 56, pp. 16-23.

Searle, G. 2007 '*Sydney's Urban Consolidation Experience: Power, politics and Community*'. Urban Research Program Research Paper 12, Griffith University, Brisbane

Seo, J-K., 2002, '*Re-urbanisation in regenerated areas of Manchester and Glasgow. New residents and the problems of sustainability*'. Cities, vol.19, no. 2, pp. 113–121.

Seo, B. & Chiu, R.L.H. 2014, '*Social Cohesiveness of Disadvantaged Communities in Urban South Korea: The Impact of the Physical Environment*', Housing Studies, vol. 29, no. 3, pp. 407-37

Setti, Giulia. 2013. "*Beyond Public Spaces: Shared Spaces in the Contemporary City.*" Journal of Civil Engineering and Architecture, vol. 7, no.7, pp. 833–840.

Sharp, D. 2003, '*High living', Journal of Urban Health*, vol. 80, no. 4, pp. 521-2.

Sherry, C., Easthope, H., 2016, *Under-supply of schooling in the gentrified and regenerated inner city, Cities*, Vol. 56, pp. 16-23.

Shi, Y. 2017, '*Explore Childrens' Outdoor Play Spaces of Community Areas in High-Density Cities in China: Wuhan as an Example*', Procedia Engineering: Urban Transition Conference, Shanghai, September 2016, vol. 198, pp. 654-83.

Shi, Y., Xie, X., Fung, J.C.-H. & Ng, E. 2018, '*Identifying critical building morphological design factors of street-level air pollution dispersion in high-density built environment using mobile monitoring*', Building and Environment, vol. 128, pp. 248-59

Snilstveit, B., Oliver, S. & Vojtkova, M. 2012, '*Narrative approaches to systematic review and synthesis of evidence for international development policy and practice*', Journal of Development Effectiveness, vol. 4, no. 3, pp. 409-29.

Söderström, O., Empson, L.A., Codeluppi, Z., Söderström, D., Baumann, P.S. & Conus, P. 2016, '*Unpacking 'the City': An experience-based approach to the role of urban living in psychosis*', Health & Place, vol. 42, pp. 104-10.

Song, Y., & Knaap, G. J. 2004, '*Measuring the effects of mixed land uses on housing values.*' Regional Science and Urban Economics, vol. 34, no. 6, pp. 663-680.

Speak, A.F., Rothwell, J.J., Lindley, S.J. & Smith, C.L. 2012, '*Urban particulate pollution reduction by four species of green roof vegetation in a UK city*', Atmospheric Environment, vol. 61, pp. 283-93.

Strath, S. I., Greenwald, M., 2007, '*Operationalizing environmental indicators for physical activity in older adults*', Journal of Aging Phys Act. Vol. 14, no. 4, pp. 14

Talen, E., 2006. '*Design for Diversity: Evaluating the Context of Socially Mixed Neighbourhoods*'. Journal of Urban Design, Vol. 11, no. 1, pp. 1-32.

Tan, Z., Lau, K. K-L., & Ng, E., 2016, '*Urban tree design approaches for mitigating daytime urban heat island effects in a high-density urban environment*', Energy and Buildings, vol. 114, pp. 265-274.

Taylor, J., Davies, M., Mavrogianni, A., Shrubsole, C., Hamilton, I., Das, P., Jones, B., Oikonomou, E., & Biddulph, P., 2016, *Mapping indoor overheating and air pollution risk modification across Great Britain: A modelling study*. London, UK: UCL Institute for Environmental Design and Engineering

Thompson, C.W. 2013, '*Activity, exercise and the planning and design of outdoor spaces*', Journal of Environmental Psychology, vol. 34, pp. 79-96.

Thompson, S., Kent, J.L. & Lyons, C., 2014, '*Building partnerships for healthy environments: research, leadership and education*'. Health Promotion Journal of Australia. Vol. 25, no. 3, pp. 202-208

Thompson, S. & Paine, G. 2017, '*What's equity got to do with health in a higher-density city?*' The Conversation, Aug 24 2017.

Turner, R. & Wigfield, A. 2017, '*Its time to recognise how harmful high-rise living can be for residents*', The Conversation, 8 December 2017.

Udell T, Daley M, Johnson B, Tolley, R. 2014, *Does density matter? The role of density in creating walkable neighbourhoods*. Melbourne: National Heart Foundation of Australia.

Vandentorren, S., Bretin, P., Zeghnoun, A., Mandereau-Bruno, L., Croisier, A., Cochet, C., Riberon, J., Siberan, I., Declercq, B., & Ledrans, M., 2016, '*August 2003 Heat Wave in France: Risk Factors for Death of Elderly People Living at Home*', European Journal of Public Health, vol. 16, no. 6, pp. 583-591.

van Kamp, I., Leidelmeijer, K., Marsman, G., & de Hollander, A. 2003, '*Urban environmental quality and human wellbeing*'. Landscape and Urban Planning, vol. 65, pp. 5–18.

Vassos, E., Pedersen, C.B., Murray, R.M., Collier, D.A. & Lewis, C.M. 2012, '*Meta-Analysis of the Association of Urbanicity With Schizophrenia*', Schizophrenia Bulletin, vol. 38, no. 6, pp. 1118-23.

Villanueva, K., Badland, H., Kvalsvig, A., O'Connor, M., Christian, H., Woolcock, G., Goldfeld, S. 2016, '*Can the Neighborhood Built Environment Make a Difference in Children's Development? Building the Research Agenda to Create Evidence for Place-Based Children's Policy*'. Academic Pediatrics, Vol. 16, no. 1, pp. 10-19.

Watts N, Adger WN, Agnolucci P, Blackstock J, Byass P, Cai W. 2015, '*Health and climate change: policy responses to protect public health.*' The Lancet. Vol. 386 (10006), pp. 1861-1914

Weaver, N. Williams, J.L. Weightman, A.L. Kitcher, H.N, Temple, JMF, Jones, P and Palmer, S (2002) *Taking STOX: developing a cross disciplinary methodology for systematic reviews of research on the built environment and the health of the public*, Journal of Epidemiology and Community Health, 56: 48-55

Wells, N. M., Evans, G. W., 2010, '*Environments and health: planning decisions as public-health decisions*', Journal of Architecture and Planning Research, vol. 27, no. 2, pp.124-143.

Wener, R., & Carmalt, H. 2006. '*Environmental psychology and sustainability in high-rise structures*'. Technology in Society, vol. 28, no.1-2, 157-167.

Wilson, E., Nicol, F., Nanayakkara, L., & Ueberjahn-Tritta, A., 2008, '*Public urban open space and human thermal comfort: The implications of alternative climate change and socio-economic scenarios*', Journal of Environmental Policy and Planning, vol. 10, no. 1. Pp. 31-45.

Yan, A. F., Voorhees, C. C., 2010, ''*Do you see what I see?' - Correlates of multidimensional measures of neighbourhood types and perceived physical activity-related neighborhood barriers and facilitators for urban youth*', Preventative Medicine: An International Journal Devoted to Practice and Theory, vol. 50, supplementary issue, S18-S23.

Yang, Y. 2008, '*A tale of two cities: physical form and neighborhood satisfaction in metropolitan Portland and Charlotte*'. Journal of the American Planning Association, Vol. 74, pp. 307–323.

Yung, E. H. K., Ho, W. K. O., Chan, E. H. W., 2017, '*Elderly satisfaction with planning and design of public parks in higher density old districts: An ordered logit model*', Landscape and Urban Planning, vol. 165, pp. 39-53

Zhang, J., Heng, C.K., Malone-Lee, L.C., Hii, D.J.C., Janssen, P., Leung, K.S. & Tan, B.K. 2012, '*Evaluating environmental implications of density: A comparative case study on the relationship between density, urban block typology and sky exposure*', Automation in Construction, vol. 22, pp. 90-101

Zhang, W. and Lawson, G., 2009. *Meeting and greeting: Activities in public outdoor spaces outside high-density urban residential communities*. Urban Design International, vol. 14, no. 4, pp. 207-214

7.0 Appendices

7.1 Appendix 1: List of domain and sub-domain keywords for the database keyword searches

Domain keywords:

High Density Development; High Density Development, planning and health; Environmental Sustainability, planning and health; High Density Development, Environmental Sustainability, planning and health; Methods, planning and health; High Density Development, Methods, Planning and Health

Total: 6

Sub-domain keywords:

Australia; New South Wales; Sydney; Victoria; Melbourne; Community/ies; Community garden; Local area; Neighbourhood(s); Suburb; Precinct; Zone; Environment; Built Environment; Sustainable Environment; Europe; United Kingdom; Fitness Professionals; Medical Professionals; Allied Health professional; Physiotherapist; Nutritionist; Dietician

Doctor; General Practitioner (GP); Naturopath; Nurse; Metropolitan; Metro; Urban; North America; Canada; United States; Organisations; Commonwealth Government; Federal Government; State Government; Local Government; General Practice; Health Centre; Government Bodies; Government Institutions; Gym; Functional Fitness; Fitness Club; Hospital; Non-government Organisations; NGOs; Planetary Health; Alternative Health; Complementary Health; Integrative Health; Ecological Health; Emotional Health; Environment and Health; Geographies of Health; Public Health; Physical Health; Relational Ecology; Social Dimensions of Health; Spiritual Health; Wellbeing; Planning; Climate Change; Green Planning; Multi-Sector Planning; Spatial Planning; Spatial Planning and Health; Planning Professionals; Architects; Designers; Urban Designers; Planners; Policy advisors; Policy makers; Policy officers; applied; Applied-action; Barriers; Obstacles; Case studies; Collaborative; Decision-Making; Decision-Making Gaps; Decision-Making; Translation; Evidence-based; Practice-relevant; Policy-relevant; Inter-institutional;

Transdisciplinary; Public-Private Partnership; Translation; Sustainable communities; Sustainable Development; Sustainable Futures; Sustainable Growth; Sustainable Urban; Growth; Sustainable Planning; Tools; Approaches; Checklist; Toolkit; Rating; Strategies;

Transport; Access; Cycling; Driving; Sustainable transport; Walking; Urban density; Urban development; Urban Growth; Urban Planning; Western; Developed countries; Developed World; Neoliberal; Neoliberal institutions

Total: 119

7.2 Appendix 2: Database Keyword Search Results

a. Wiley Online Library Database (Planning and Architecture Journal Search)

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Australia	10	0	0	0	0	0
New South Wales	0	0	0	0	0	0
Sydney	0	0	0	0	0	0
Victoria	2	2	5	1	7	2
Melbourne	8	0	0	0	31	6
Community/ies	18	4	3	2	67	8
Community garden	0	0	0	0	0	0
Local area	0	0	14	0	25	0
Neighbour-hood(s)	5	5	34	1	37	17
Suburb	16	12	59	7	79	4
Precinct	12	10	64	1	78	3
Zone	0	0	0	0	0	0
Environment	0	0	32	0	27	0
Built Environment	0	0	4	0	19	0
Sustainable Environment	0	0	8	0	23	0
Europe	24	53	117	31	238	27

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
United Kingdom	20	24	52	6	89	3
Fitness Professionals	0	0	0	0	0	0
Medical Professionals	0	0	3	0	17	0
Allied Health professional	0	0	0	0	0	0
Physiotherapist	0	0	0	0	5	0
Nutritionist	0	0	0	0	0	0
Dietician	0	0	0	0	0	0
Doctor	0	0	0	0	0	0
General Practitioner (GP)	0	0	0	0	0	0
Naturopath	0	0	0	0	0	0
Nurse	0	0	0	0	3	0
Metropolitan	4	7	18	3	65	2
Metro	18	12	23	10	87	10
Urban	6	2	17	0	46	1
North America	1	1	5	0	13	0
Canada	0	0	4	0	7	0
United States	1	0	17	0	61	1
Organisations	23	11	49	3	109	4

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Commonwealth Government	0	0	0	0	2	0
Federal Government	0	0	3	0	2	0
State Government	0	0	1	0	6	0
Local Government	1	1	36	0	47	0
General Practice	0	0	0	0	0	0
Health Centre	0	0	0	0	0	0
Government Bodies	0	0	7	0	0	0
Government Institutions	0	0	0	0	0	0
Gym	0	0	0	0	0	0
Functional Fitness	0	0	0	0	0	0
Fitness Club	0	0	0	0	0	0
Hospital	2	0	0	0	19	0
Non-government Organisations	0	0	0	0	0	0
NGOs	0	0	0	0	0	0
Planetary Health	4	4	8	0	5	0
Alternative Health	3	1	5	0	18	1

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Complementary Health	0	0	2	0	7	0
Integrative Health	0	0	0	0	0	0
Ecological Health	9	5	62	2	71	3
Emotional Health	0	0	38	0	49	0
Environment and Health	8	3	93	0	113	2
Geographies of Health	3	0	38	0	81	0
Public Health	9	5	17	0	42	3
Physical Health	4	0	41	0	43	0
Relational Ecology	0	0	4	0	0	0
Social Dimensions of Health	2	1	31	0	63	0
Spiritual Health	0	0	2	0	4	0
Wellbeing	0	0	1	0	3	0
Planning	31	23	95	6	158	3
Climate Change	0	0	3	0	7	0
Green Planning	0	0	6	0	15	0
Multi-Sector Planning	1	0	1	0	7	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Spatial Planning	0	0	0	0	2	0
Spatial Planning and Health	0	0	0	0	0	0
Planning Professionals	0	0	0	0	0	0
Architects	1	1	5	0	7	1
Designers	0	0	0	0	0	0
Urban Designers	0	0	0	0	0	0
Planners	3	2	26	0	53	0
Policy advisors	0	0	35	0	74	0
Policy makers	0	0	21	0	43	0
Policy officers	0	0	4	0	35	0
applied	1	1	0	0	6	0
Applied-action	0	0	0	0	1	0
Barriers	0	0	2	0	74	0
Obstacles	0	0	0	0	34	0
Case studies	0	0	43	0	79	0
Collaborative	0	0	12	0	32	0
Decision-Making	0	0	3	0	4	0
Decision-Making Gaps	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Decision-Making Translation	0	0	0	0	0	0
Evidence-based	0	0	0	0	0	0
Practice-relevant	0	0	0	0	0	0
Policy-relevant	0	0	0	0	4	0
Inter-institutional	0	0	0	0	1	0
Transdisciplinary	0	0	2	0	3	0
Public-Private Partnership	0	0	0	0	0	0
Translation	1	0	0	0	36	0
Sustainable communities	7	5	42	2	49	3
Sustainable Development	9	7	75	4	158	4
Sustainable Futures	0	0	2	0	35	0
Sustainable Growth	1	1	4	1	52	0
Sustainable Urban Growth	0	0	2	0	45	0
Sustainable Planning	1	1	16	1	63	0
Tools	3	0	6	0	53	0
Approaches	0	0	4	0	32	0
Checklist	0	0	0	0	2	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Toolkit	0	0	0	0	15	0
Rating	0	0	0	0	0	0
Strategies	5	0	23	0	43	0
Transport	26	16	89	2	153	1
Access	0	0	23	0	32	0
Cycling	0	0	0	0	0	0
Driving	0	0	0	0	0	0
Sustainable transport	0	0	0	0	2	0
Walking	0	0	0	0	3	0
Urban density	3	2	4	0	5	0
Urban development	7	4	24	2	63	3
Urban Growth	5	2	32	0	53	2
Urban Planning	16	7	36	2	54	4
Western	0	0	0	0	3	0
Developed countries	0	0	0	0	2	0
Developed World	0	0	3	0	2	0
Neoliberal	3	1	2	1	6	2
Neoliberal institutions	2	2	1	0	5	1

b. Health Collections Database

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Australia	6	1 (not relevant)	0	0	248	1 (not relevant)
New South Wales	1 (not relevant)	0	7 (relevant)	0	39 (1 relevant)	0
Sydney	0	0	1 (relevant)	0	51 (2 relevant)	0
Victoria	0	0	1 (relevant)	0	38 (some highly relevant)	0
Melbourne	2 (relevant)	0	0	0	38	0
Community/ies	1 (not relevant)	0	1 (relevant)	0	73 (some relevant)	0
Community garden	0	0	0	0	0	0
Local area	0	0	0	0	3 (all relevant)	0
Neighbour-hood(s)	0	4 (3 relevant)	0	0	2 (relevant)	0
Suburb	0	0	0	0	0	0
Precinct	0	0	0	0	0	0
Zone	0	0	0	0	0	0
Environment	0	0	1 (possibly relevant)	0		
Build Environment	0	0	0	0	4 (3 relevant)	0
Sustainable Environment	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Europe	0	0	0	0	0	0
United Kingdom	0	0	0	0	4 (not relevant)	0
Fitness Professionals	0	0	0	0	3 (1 relevant)	0
Medical Professionals	0	0	0	0	28 (few relevant)	0
Allied Health professional	0	0	0	0	3 (not relevant)	0
Physiotherapist	0	0	0	0	0	0
Nutritionist	0	0	0	0	1 (relevant)	0
Dietician	0	0	0	0	0	0
Doctor	0	0	0	0	3 (not relevant)	0
General Practitioner (GP)	0	0	0	0	9 (not relevant)	0
Naturopath	0	0	0	0	0	0
Nurse	0	0	0	0	21 (not relevant)	0
Metropolitan	0	0	0	0	10 (1 relevant)	0
Metro	0	0	0	0	0	0
Urban	0	0	1 (relevant)	0	10 (several relevant)	0
North America	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Canada	0	0	0	0	3 (not relevant)	0
United States	0	0	0	0	4 (not relevant)	0
Organisations	0	0	0	0	16 (2 relevant)	0
Commonwealth Government	0	0	0	0	0	0
Federal Government	0	0	0	0	0	0
State Government	0	0	0	0	6 (1 relevant)	0
Local Government	1 (relevant)	1 (relevant)	1 (relevant)	0	10 (some relevant)	0
General Practice	0	0	0	0	33 (not relevant)	0
Health Centre	1 (possibly relevant)	0	1 (relevant)	0	78 (some relevant)	0
Government Bodies	0	0	0	0	2 (not relevant)	0
Government Institutions	0	0	0	0	0	0
Gym	0	0	0	0	0	0
Functional Fitness	0	0	0	0	0	0
Fitness Club	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Hospital	5 (not relevant)	0	0	0	69 (not relevant)	0
Non-government Organisations	0	0	0	0	0	0
NGOs	0	0	0	0	0	0
Planetary Health	0	0	0	0	0	0
Alternative Health	1 (not relevant)	0	0	0	11 (1 relevant)	0
Complementary Health	0	0	0	0	3 (not relevant)	0
Integrative Health	0	0	1 (relevant)	0	1 (not relevant)	0
Ecological Health	0	0	0	0	2 (relevant)	0
Emotional Health	0	0	0	0	7 (not relevant)	0
Environment and Health	0	0	2 (1 relevant)	0	21 (some relevant)	0
Geographies of Health	0	0	0	0	0	0
Public Health	1 (relevant)	1 (relevant)	1 (relevant)	0	75 (some relevant)	0
Physical Health	1 (not relevant)	0	0	0	29 (some relevant)	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Relational Ecology	0	0	0	0	0	0
Social Dimensions of Health	0	0	0	0	0	0
Spiritual Health	0	0	0	0	0	0
Wellbeing	0	0	0	0	9 (some relevant)	0
Planning	2 (1 relevant)	2 (1 relevant)	2 (1 relevant)	0	248 (some relevant)	1 (not relevant)
Climate Change	0	0	0	0	3 (all relevant)	0
Green Planning	0	0	0	0	6 (not relevant)	0
Multi-Sector Planning	0	0	0	0	0	0
Spatial Planning	0	0	0	0	3 (1 relevant)	0
Spatial Planning and Health	0	0	0	0	3 (1 relevant)	0
Planning Professionals	0	0	0	0	82 (some relevant)	0
Architects	0	0	0	0	0	0
Designers	0	0	0	0	1 (not relevant)	0
Urban Designers	0	0	0	0	0	0
Planners	0	0	0	0	18 (some relevant)	0
Policy advisors	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Policy makers	0	0	0	0	6 (some relevant)	0
Policy officers	0	0	0	0	1 (relevant)	0
applied	1 (not relevant)	0	0	0	0	0
Applied-action	0	0	0	0	0	0
barriers	0	0	0	0	24 (some relevant)	0
Obstacles	0	0	0	0	1 (not relevant)	0
Case studies	0	0	0	0	8 (1 relevant)	0
Collaborative	0	0	0	0	13 (some relevant)	0
Decision-Making	0	0	0	0	16 (some relevant)	0
Decision-Making Gaps	0	0	0	0	0	0
Decision-Making Translation	0	0	0	0	1 (relevant)	0
Evidence-based	0	0	0	0	13 (some relevant)	0
Practice-relevant	0	0	0	0	0	0
Policy-relevant	0	0	0	0	0	0
Inter-institutional	0	0	0	0	0	0
Transdisciplinary	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Public-Private Partnership	0	0	0	0	0	0
Translation	0	0	0	0	4 (1 relevant)	0
Sustainable communities	0	0	1 (relevant)	0	2 (not relevant)	0
Sustainable Development	0	0	1 (not relevant)	0	5 (not relevant)	0
Sustainable Futures	0	0	0	0	0	0
Sustainable Growth	0	0	0	0	0	0
Sustainable Urban Growth	0	0	0	0	0	0
Sustainable Planning	0	0	1 (not relevant)	0	9 (not relevant)	0
Tools	0	0	0	0	13 (some relevant)	0
Approaches	0	0	0	0	18 (some relevant)	0
Checklist	0	0	0	0	1 (not relevant)	0
Toolkit	0	0	0	0	0	0
Rating	0	0	0	0	3 (not relevant)	0
Strategies	1 (not relevant)	1 (not relevant)	0	0	50 (some relevant)	(not relevant)
Transport	0	0	0	0	6 (some relevant)	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Access	1 (relevant)	1 (relevant)	0	0	23 (some relevant)	0
Cycling	0	0	0	0	3 (2 relevant)	0
Driving	0	0	0	0	0	0
Sustainable transport	0	0	0	0	0	0
Walking	0	0	0	0	7 (3 relevant)	0
Urban density	1 (not relevant)	1 (not relevant	0	0	1 (relevant)	0
Urban development	1 (not relevant)	0	0	0	0	0
Urban Growth	0	0	0	0	0	0
Urban Planning	0	0	1 (relevant)	0	10 (some relevant)	0
Western	0	0	0	0	31 (some relevant)	0
Developed countries	0	0	0	0	5 (not relevant)	0
Developed World	0	0	0	0	4 (not relevant)	0
Neoliberal	0	0	0	0	0	0
Neoliberal institutions	0	0	0	0	0	0

c. Web of Science

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Australia	54	9	23	1	1236 (too broad)	4
New South Wales	62 (3 relevant)	1	3	0	153	1
Sydney	49	2	0	0	110	1
Victoria	55	0	0	0	147	0
Melbourne	26	2	1	0	76	1
Community/ies	2813	28	115	1	7126	12
Community garden	21	0	5	0	23	0
Local area	964	16	34	3	872	3
Neighbour-hood(s)	376	22	26	2	451	9
Suburb	93	0	1	0	37	0
Precinct	7	0	0	0	4	0
Zone	2181	11	14	0	326	6
Environment	4282	51	4	4	2632	6
Build Environment	470	24	100	2	470	8
Sustainable Environment	305	10	X	X	165	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Europe	482	3	9	0	627	2
United Kingdom	60	1	5	0	365	0
Fitness Professionals	1	1	2	0	0	0
Medical Professionals	18	2	5	0	1119	0
Allied Health professional	1	0	0	0	115	0
Physiotherapist	0	0	0	0	94	0
Nutritionist	4	0	0	0	39	0
Dietician	8	0	0	0	109	0
Doctor	47	1	0	0	1202	0
General Practitioner (GP)	30	4	1	0	911	2
Naturopath	0	0	0	0	3	0
Nurse	113	8	12	0	3695	4
Metropolitan	298	15	9	0	406	4
Metro	42	1	0	0	32	1
Urban	1910	71	120	4	2284	22
North America	297	1	3	0	114	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Canada	481	4	13	1	1142	0
United States	967	13	24	0	3471	6
Organisations	974	14	64	0	4489	5
Commonwealth Government	2	0	0	0	0	0
Federal Government	18	1	4	0	123	0
State Government	101	3	13	0	420	1
Local Government	423	2	19	0	423	0
General Practice	140	3	3	0	1593	3
Health Centre	164	18	29	1	4989	10
Government Bodies	16	0	2	0	24	0
Government Institutions	24	0	6	0	118	0
Gym	5	0	0	0	10	0
Functional Fitness	23	0	0	0	29	0
Fitness Club	0	0	0	0	11	0
Hospital	393	12	24	0	6300	6

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Non-government Organisations	6	0	3	0	106	0
NGOs	6	0	3	0	62	0
Planetary Health	3	0	1	0	2	0
Alternative Health	94	5	24	1	1177	3
Complementary Health	27	2	3	0	361	0
Integrative Health	10	1	4	0	203	1
Ecological Health	62	10	59	1	390	2
Emotional Health	16	2	4	0	816	0
Environment and Health	281	51	381	4	2632	14
Geographies of Health	18	7	5	0	163	4
Public Health	389	49	115	0	7001	21
Physical Health	422	30	67	0	4225	10
Relational Ecology	0	0	0	0	1	0
Social Dimensions of Health	2	0	13	0	186	0
Spiritual Health	1	0	1	0	126	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Wellbeing	18	0	17	0	244	0
Planning	1666	138	381	4	36030	50
Climate Change	941	13	53	0	305	2
Green Planning	100	15	41	2	212	1
Multi-Sector Planning	10	2	5	0	94	0
Spatial Planning	354	23	20	1	572	10
Spatial Planning and Health	23	23	20	1	572	10
Planning Professionals	26	9	37	0	4260	3
Architects	22	0	2	0	21	0
Designers	159	1	5	0	59	1
Urban Designers	18	1	3	3	11	1
Planners	140	8	381	4	387	6
Policy advisors	1	0	0	0	14	0
Policy makers	73	5	34	0	941	2
Policy officers	3	1	2	0	68	0
applied	5271	15	39	0	3081	8
Applied-action	1	0	0	0	1	1
Barriers	1300	3	21	0	3039	1
Obstacles	273	2	5	0	322	0
Case studies	3013	16	67	0	4260	7

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Collaborative	119	3	19	0	926	2
Decision-Making	222	7	37	1	2362	1
Decision-Making Gaps	7	0	1	0	124	0
Decision-Making Translation	2	2	2	0	74	0
Evidence-based	83	3	19	0	1891	1
Practice-relevant	0	0	0	0	6	0
Policy-relevant	2	0	3	0	27	0
Inter-institutional	0	0	1	0	6	0
Transdisciplinary	3	0	1	0	26	0
Public-Private Partnership	4	0	1	0	52	0
Translation	177	0	10	0	479	0
Sustainable communities	175	5	46	1	256	1
Sustainable Development	1349	19	103	4	371	4
Sustainable Futures	236	6	44	1	130	3

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Sustainable Growth	302	7	20	3	51	1
Sustainable Urban Growth	95	6	13	3	14	0
Sustainable Planning	239	19	169	3	728	4
Tools	3055	23	65	1	3428	11
Approaches	6879	25	156	2	6859	8
Checklist	14	1	6	1	388	0
Toolkit	19	0	2	0	81	0
Rating	177	5	33	2	8835	12
Strategies	4216	36	103	1	5951	10
Transport	3998	16	30	0	508	7
Access	1096	18	32	0	4187	8
Cycling	3910	2	40	0	751	1
Driving	2962	4	24	0	930	1
Sustainable transport	115	0	19	0	40	0
Walking	264	15	18	0	554	6

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Urban density	1915	71	11	4	123	22
Urban development	1915	71	62	4	483	22
Urban Growth	448	18	20	3	15121	50
Urban Planning	582	71	120	4	2291	22
Western	1643	6	8	0	755	2
Developed countries	504	11	43	0	2152	3
Developed World	485	8	31	0	922	3
Neoliberal	5	0	1	0	3	0
Neoliberal institutions	0	0	0	0	1	0

d. APAFT – Australian Public Affairs Full Text
APAIS-ATSIS – Australian Public Affairs Information Service – Aboriginal and Torres Strait Islander Subject
APAIS-Health – Australian Public Affairs Information Service - Health

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Australia	10 (2 relevant - saved)	0	7 (saved)	0	153 (saved)	0
NSW	1 NA	0	1 NA	0	74 (not saved, same as above)	0
New South Wales	1 NA	0	3 saved	0	282	0
Sydney	0	0	0	0	287	0
Victoria	1 NA	0	2 saved	0	231	0
Melbourne	2 NA	0	1 saved	0	202	0
Communit*	2 (2 – saved)	0	2 NA	0	608	0
Community garden	0	0	0	0	0	0
Local area	1	2 NA	17 (saved)	0	48 (saved)	0
Neighbour(s)/ hood	0	0	1	0	12 (saved)	0
Suburb	0	0	0	0	3 NA	0
Precinct	0	0	1 NA	0	0	0
Zone	0	1 saved	4 NA	0	0	0
Environment	0	5 saved	4 NA	0	28 saved	0
Built environment	0	0	11 saved	0	8 saved	0
Sustainable environment	0	3 saved	40 saved	0	0	0
Europe	0	0	5 saved	0	0	0
England	1NA	0	6 saved	0	0	0
United Kingdom	0	1	1 NA	0	9	0
Fitness professionals	0	0	0	0	5 saved	0
Medical professionals	0	0	0	0	55 saved	0
Allied Health professional	0	0	0	0	4	0
Physiotherapist	0	0	0	0	0	0
Nutritionist	0	0	0	0	2	0
Dietician	0	0	0	0	0	0
Doctor	0	0	0	0	2	0
General Practitioner/GP	0	0	0	0	8	0
Naturopath	0	0	0	0	0	0
Nurse(s)	0	0	0	0	20	0
Metropolitan	3 NA	2 saved	2 saved	0	0	0
Metro	0	0	0	0	0	0
Urban	10	3 saved	45	0	16	0
North America	0	0	0	0	0	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Canada	0	0	0	0	2 NA	0
United States	0	0	0	0	4	0
Organisations	0	0	4 NA	0	33 saved	0
Commonwealth government	0	1 NA	0	0	0	0
Federal government	0	1NA	0	0	0	0
State government	3NA	2 NA	0	0	17 SAVED	0
Local government	3 NA	3 NA	0	0	20 saved	0
General Practice	0	2 NA	0	0	31 NA	0
Health Centre	2 NA	2 NA	0	0	94 saved	0
Government bodies	0	1	0	0	4 saved	0
Government institutions	0	0	0	0	0	0
Gym	0	0	0	0	0	0
FUNCTIONAL FITNESS	0	0	0	0	0	0
Fitness centre	0	0	0	0	3 NA	0
Fitness club	0	0	0	0	0	0
Hospital	4 NA	3 NA	1	0	73	0
Non government orgainsations	0	0	0	0	0	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Non-government organisations	0	0	0	0	0	0
Non-government-organisations	0	0	0	0	0	0
NGOs	0	0	0	0	0	0
Planetary health	0	0	0	0	0	0
Alternative health	0	2 saved	2 NA	0	12	0
Complementary health	0	0	0	0	4 NA	0
Integrative health	0	0	0	0	0	0
Ecological health	0	0	0	0	4	0
Emotional health	0	0	0	0	3	0
Environment and health	0	5 saved	7	0	28 saved	0
Geographies of health	0	0	0	0	0	0
Public health	0	6 saved	10 Saved	0	105 saved	0
Physical health	0	2 saved	2 NA	0	46	0
Relational ecology	0	0	0	0	0	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Social dimensions of health	0	0	0	0	0	0
Spiritual health	0	0	0	0	0	0
Wellbeing	1 NA	0	2 NA	0	15 saved	0
Planning	11 NA	15 saved	21	0	304	2 NA
Climate change	0	1 saved	6	0	6 saved	0
Green planning	0	2 NA	0	0	7	0
Multi-sector planning	0	0	0	0	0	0
Spatial planning	0	I NA	0	0	2 saved	0
Spatial planning and health	0	1 NA	0	0	2 saved	0
Planning professionals	0	0	6 NA	0	155	0
Architects	0	0	0	0	0	0
Designers	0	0	0	0	2	0
Urban Designers	0	0	0	0	0	0
Planners	0	0	0	0	10	0
Policy		7	10 saved	0	62 saved	0
Policy Advisors OR/Makers/OR Officers		975	859	0	6506	0
Applied policy / Applied action		0	0	0	5944	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Barriers/ Obstacles to policy		975	0	28 saved	0	0
Policy case studies		0	0	0	0	0
Collaborative policy		0	0	0	6 saved	0
Policy and decision making		0	4 saved	0	8 saved	0
Policy gap		0	0	0	5 saved	0
Policy translation		0	0	0	2	0
Evidence based policy		0	0	0	9 saved	0
Policy to practice / OR practice relevant policy		0	0	28 saved	0	30 NA
Inter-institutional policy	0	0	0	0	0	0
Transdisciplinary policy	0	0	0	0	0	0
Public Private Partnership	1 (saved)	0	0	0	0	0
Decision making	9	1 NA	4	0	0	0
Research*	617	9 saved	5	0	173	2 NA
Researcher	9	0	0	0	2	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Evaluation	98 NA	1NA	7	0	96	0
Research gaps	3 NA	0	0	0	11 NA	0
Research methods	97 (saved)	4	4 saved	0	173	2 NA
Research review	53 NA	3 NA	0	0	60 saved	0
Research translation	0	0	0	0	2	0
Sustainable	96 (saved)	4 saved	11 NA	0	5 saved	0
Sustainable communities	10 (saved)	0	11 NA	0	4 saved	0
Resilient communities	1 NA	0	0	0	0	0
Sustainable development	96 (saved)	4 save	9 NA	0	3 NA	0
Sustainable futures	0	0	1 NA	0	0	0
Sustainable growth / OR Sustainable urban growth	1476	995	862	0	0	28 NA
Sustainable growth	31 (saved)	3 saved	0	0	0	
Sustainable urban growth	5 (saved)	1 saved	0	0	0	
Sustainable planning	30	4 saved	11 saved	0	5	0
Tools	25 NA	0	0	0	19 saved	0
Approach(es)	22 (saved)	0	1	0	25 saved	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Checklist(s)	0	0	0	0	0	0
Rating	12 NA	0	0	0	0	0
Strategies	99	6 NA	6 NA	0	70 saved	2
Transport	138 Not saved	4 NA	2 NA	0	11 saved	0
Access	49 Saved	2	2 NA	0	28 saved	0
Cyclist/OR Cycling	12201	0	859	28 NA	0	0
Driver/Driving	11763	0	859	28 NA	0	0
Sustainable transport	22 saved	1	0	0	0	0
walking	8 saved	1 SAVED	0	0	13 saved	0
urban	152	3 saved	5 NA	0	2 saved	0
Urban density	152	3 saved	0	0	2 saved	0
Urban development	152	3 saved	5 NA	0	7 saved	0
Urban growth	27 NA	2 saved	0	0	2	0
Urban planning	85 saved	3	5	0	16 NA	0
Western countries	7 NA	0	0	0	2	0
Developed countries	18 NA	0	0	0	2 NA	0
Neoliberal countries / institutions	991	975	0	0	5944	0

e. ATRI, Health and Society (using Informit)

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Australia	63 saved	1 saved	10 saved	0	43 saved	0
NSW	1 NA	0	0	0	21 saved	0
New South Wales	10 saved	0	0	0	19 saved	0
Sydney	15 NA	0	2 saved	0	17 saved	0
Victoria	28 saved	1 saved	2 saved	0	16 saved	0
Melbourne	22 saved	1 saved	2 saved	0	15 saved	0
Communit*	18 saved	0	5 saved	0	40 saved	0
Community garden	0	0	0	0	0	0
Local area	5 NA	0	5 saved	0	2 NA	0
Neighbour(s)/ hood		0	1 NA	0	3 NA	0
Suburb	2 NA	0	0	0	0	0
Precinct	0	0	0	0	0	0
Zone	1 saved	0	0	0	0	0
Environment	21 saved	0	11 saved	0	14 saved	0
Built environment	8 saved	0	1 saved	0	0	0
Sustainable environment	5 saved	0	5 saved	0	0	0
Europe	1 NA	0	2	0	0	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
England	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0
Fitness professionals	0	0	0	0	0	0
Medical professionals	0	0	0	0	0	0
Allied Health professional	0	0	0	0	0	0
Physiotherapist	0	0	0	0	0	0
Nutritionist	0	0	0	0	0	0
Dietician	0	0	0	0	0	0
Doctor	0	0	0	0	0	0
General Practitioner/GP	0	0	0	0	0	0
Naturopath	0	0	0	0	0	0
Nurse(s)	0	0	0	0	0	0
Metropolitan	12 saved	0	1	0	0	0
Metro	4 saved	0	0	0	0	0
Urban	53 saved	0	11 saved	0	0	0
North America	1 NA	0	0	0	0	0
Canada	1 saved	0	1 NA	0	0	0
United States	5 NA	0	0	0	0	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Organisations	1 saved	0	0	0	0	0
Commonwealth government	0	0	0	0	0	0
Federal government	2 saved	0	0	0	0	0
State government	4 saved	0	1 saved	0	0	0
Local government	4 saved	0	1 saved	0	0	0
General Practice	0	0	0	0	0	0
Health Centre	0	0	4 saved	0	0	0
Government bodies	0	0	0	0	0	0
Government institutions	0	0	0	0	0	0
Gym	0	0	0	0	0	0
Functional fitness	0	0	0	0	0	0
Fitness centre	0	0	0	0	0	0
Fitness club	0	0	0	0	0	0
Hospital	0	0	0	0	0	0
Non government orgainsations	0	0	0	0	0	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Non-government organisations OR Non-government-organisations OR NGOs	0	0	463	165	119	46 NA
Planetary health	0	0	0	0	0	0
Alternative health	0	0	1 saved	0	4	0
Complementary health	0	0	0	0	0	0
Integrative health	0	0	0	0	0	0
Ecological health	0	0	0	0	0	0
Emotional health	0	0	0	0	0	0
Environment and health	2 saved	0	11	0	9 saved	0
Geographies of health	0	0		0	0	0
Public health	2 saved	1 saved		0	14 saved	0
Physical health	2	1	5 saved	0	7 saved	0
Relational ecology	0	0	0	0	0	0
Social dimensions of health	0	0	0	0	0	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Spiritual health	0	0	0	0	0	0
Wellbeing	0	0	1 saved	0	2 saved	0
Planning	43 saved	2 saved	19	0	34	0
Climate change	0	0	1 saved	0	0	0
Green planning	1	0	0	0	1	0
Multi-sector planning	0	0	0	0	0	0
Spatial planning and health	0	0	2 saved	0	3 NA	0
Planning professionals	1 NA	0	0	0	1	0
Architects	0	0	0	0	0	0
Designers	1 NA	0	0	0	0	0
Urban Designers	0	0	0	0	0	0
Planners	4 saved	0	0	0	2	0
Policy	23 saved	2 saved	9	0	15 saved	0
Policy Advisors OR/Makers/ OrOfficers	119	119	462	0	9260	0
Applied policy/ Or Applied action	0	0	0	0	8645	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Barriers/ Obstacles to policy	0	0	0	119	0	0
Policy case studies	1 saved	0	0	0	4	0
Collaborative policy	0	0	0	0	1	0
Decision making	1	0	0	0	2	0
Policy gaps	0	0	0	0	1NA	0
Policy translation	0	0	0	0	0	0
Evidence based policy	0	0	1 saved	0	1	0
Policy to practice	5 NA	0	1	0	1 NA	0
Policy relevant / practice relevant	0	0	466	119	8648	120
Inter-institutional policy	0	0	0	0	0	0
Transdisciplinary	0	0	0	0	1 NA	0
Public private partnership	0	0	0	0	1 NA	0
Decision making	1 NA	0	0	0	2 NA	0
Research / Researchers	0	0	489	0	8646	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Case studies	0	0	0	0	5 saved	0
Evaluation	2	0	2	0	9 saved	0
Research gaps	0	0	0	0	2 NA	0
methods	5 NA	0	0	0	34 saved	0
review	5 NA	0	0	0	3	0
Translation	0	0	0	0	0	0
Sustainable communities OR (resilient)	0	0	462	0	8645	119
Sustainable development	11 saved	0	2 saved	0	4 saved	0
Sustainable futures	0	0	0	0	0	0
Sustainable growth / urban growth	214	0	467	0	0	0
Sustainable planning	7 saved	0	9 saved	0	5 saved	0
Tools	2 NA	0	1 saved	0	3 saved	0
Approaches	4 NA	0	1 saved	0	3 saved	0
Checklist	0	0	0	0	0	0
Rating	1 NA	0	0	0	1	0
Strategies	13 saved	1 NA	2 saved	0	5 NA	0

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Sustainable transport	10 saved	0	8 saved	0	5 NA	0
Access	10 saved	0	2 saved	0	8 saved	0
Cyclist/Cycling	1897	0	483	0	0	0
Driver/Driving	9121	13011	473	0	1NA	0
Walking	8 saved	1 saved	6	0	5 saved	0
Urban density/OR development/ OR growth/OR planning	5 saved	63 saved	5292	119	9094	915
Western countries	0	0	0	0	0	0
Developed countries/ Or developed world	277	747	0	119	0	0
Neoliberal countries OR Neoliberal institutions	119	0	0	0	8645	0

f. Humanities and Social Science Index

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Australia	8	0	3	0	10	0
New South Wales	2	0	0	0	2	0
Sydney	1	0	1	0	3	0
Victoria	3	0	1	0	2	0
Melbourne	2	0	1	0	2	0
Community/ies	3	0	0	0	5	0
Community garden	0	0	0	0	0	0
Local area	0	0	0	0	1	0
Neighbour-hood(s)	0	0	0	0	0	0
Suburb	0	0	0	0	0	0
Precinct	0	0	0	0	0	0
Zone	1	0	0	0	0	0
Environment	3	0	2	0	2	0
Build Environment	1	0	0	0	0	0
Sustainable Environment	1	2	0	0	0	0
Europe	0	0	0	0	0	0
United Kingdom	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Fitness Professionals	0	0	0	0	0	0
Medical Professionals	0	0	0	0	0	0
Allied Health professional	0	0	0	0	0	0
Physiotherapist	0	0	0	0	0	0
Nutritionist	0	0	0	0	0	0
Dietician	0	0	0	0	0	0
Doctor	0	0	0	0	0	0
General Practitioner (GP)	0	0	0	0	0	0
Naturopath	0	0	0	0	0	0
Nurse	0	0	0	0	0	0
Metropolitan	1	0	0	0	0	0
Metro	0	0	0	0	0	0
Urban	4	0	0	0	0	0
North America	0	0	0	0	0	0
Canada	1	0	0	0	1	0
United States	1	0	0	0	0	0
Organisations	0	0	0	0	1	0
Commonwealth Government	0	0	0	0		0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Federal Government	0	0	0	0		0
State Government	2	0	0			
Local Government	1	0	0			
General Practice	0	0	0	0		0
Health Centre	0	0	1	0		0
Government Bodies	0	0	0	0		0
Government Institutions	1	0	0			
Gym	0	0	0	0		0
Functional Fitness	0	0	0	0		0
Fitness Club	0	0	0	0		0
Hospital	0	0	1	0		0
Non-government Organisations	0	0	0	0		0
NGOs	0	0	0	0		0
Planetary Health	0	0	0	0		0
Alternative Health	0	0	0	0		0
Complementary Health	0	0	0	0		0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Integrative Health	0	0	0	0		0
Ecological Health	0	0	0	0		0
Emotional Health	0	0	0	0		0
Environment and Health	0	0	2	0		0
Geographies of Health	0	0	0	0		0
Public Health	1	0	0			
Physical Health	0	0	0	0		0
Relational Ecology	0	0	0	0		0
Social Dimensions of Health	0	0	0	0		0
Spiritual Health	0	0	0	0		0
Wellbeing	1	0	0	0		0
Planning	5	0	2	0		0
Climate Change	1	0	0	0		0
Green Planning	1	0	0	0		0
Multi-Sector Planning	0	0	0	0	0	0
Spatial Planning	0	0	1	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Spatial Planning and Health	0	0	1	0	0	0
Planning Professionals	0	0	5	0	0	0
Architects	0	0	0	0	0	0
Designers	1	0	0	0	0	0
Urban Designers	1	1	0	0	0	0
Planners	1	1	0	0	0	0
Policy advisors	0	0	0	0	0	0
Policy makers	1	1	1	0	1	0
Policy officers	0	0	0	0	0	0
Applied	4	0	0	0	1	0
Applied-action	0	0	0	0	0	0
Barriers	0	0	0	0	0	0
Obstacles	0	0	0	0	0	0
Case studies	0	0	1	0	2	0
Collaborative	0	0	0	0	1	0
Decision-Making	0	0	0	0	0	0
Decision-Making Gaps	0	0	0	0	0	0
Decision-Making Translation	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Evidence-based	0	0	0	0	0	0
Practice-relevant	0	0	0	0	0	0
Policy-relevant	0	0	0	0	0	0
Inter-institutional	0	0	0	0	0	0
Transdisciplinary	0	0	0	0	0	0
Public-Private Partnership	0	0	0	0	0	0
Translation	0	0	0	0	0	0
Sustainable communities	0	0	0	0	0	0
Sustainable Development	3	0	0	0	0	0
Sustainable Futures	0	0	0	0	0	0
Sustainable Growth	0	0	0	0	0	0
Sustainable Urban Growth	0	0	0	0	0	0
Sustainable Planning	1	0	9	0	0	0
Tools	0	0	1	0	2	0
Approaches	1	0	2	0	2	0
Checklist	0	0	0	0	0	0

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Toolkit	0	0	0	0	0	0
Rating	0	0	0	0	0	0
Strategies	0	0	1	0	4	0
Transport	1	1	0	0	0	0
Access	0	0	1	0	2	0
Cycling	0	0	0	0	0	0
Driving	0	0	0	0	0	0
Sustainable transport	0	0	0	0	0	0
Walking	0	0	0	0	0	0
Urban density	4	0	0	0	0	0
Urban development	4	0	0	0	0	0
Urban Growth	2	0	0	0	0	0
Urban Planning	4	0	0	0	0	0
Western	0	0	0	0	1	0
Developed countries	0	0	0	0	0	0
Developed World	1	0	0	0	0	0
Neoliberal	0	0	0	0	0	0
Neoliberal institutions	0	0	0	0	0	0

g. Science Direct

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Australia	53157	9226	16358	4898	72305	14254
New South Wales	16882	3524	4868	1879	13226	3208
Sydney	17953	2893	3967	1500	12212	2630
Victoria	20633	3422	4652	1732	14888	3113
Melbourne	14205	2428	4	2	9770	2222
Community/ies	202655	38968	73234	18033	217737	33537
Community garden	11721	4558	7073	2910	11763	3886
Local area	450109	46802	68898	20844	185948	40911
Neighbour-hood(s)	53353	11947	11124	4359	27414	7458
Suburb	3177	1198	1269	625	2911	969
Precinct	591	221	317	147	512	174
Zone	356838	25770	28069	12470	65511	22947
Environment	554709	51591	110433	6815	233253	45172
Build Environment	113913	19851	38099	11874	61490	17319
Sustainable Environment	146496	26819	110432	26816	88545	23219
Europe	255613	34541	50691	15013	156259	29974
United Kingdom	45949	9818	14534	4475	49514	8624

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Fitness Professionals	3866	2091	3561	1106	9143	1837
Medical Professionals	24156	11462	25594	4190	114347	9913
Allied Health professional	1706	1301	3292	668	10319	1157
Physiotherapist	1075	527	1144	177	6762	476
Nutritionist	3163	1409	1475	516	6112	1185
Dietician	3211	1590	1576	489	7949	1337
Doctor	22823	7083	14041	2439	75231	6152
General Practitioner (GP)	26121	9492	20925	4075	80414	8384
Naturopath	173	91	155	36	627	79
Nurse	19722	7379	17366	2363	94285	6296
Metropolitan	23213	8165	9747	4101	29153	6824
Metro	6280	2056	2242	1094	5773	1682
Urban	98842	27044	40062	13927	95089	23058
North America	119649	21643	28464	9620	85703	18671
Canada	14593	19472	27020	8372	94359	17304
United States	153555	31415	47102	12751	167369	27026
Organisations	201719	32689	63098	14320	191505	28238

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Commonwealth Government	2837	1295	2842	794	5541	1112
Federal Government	21222	9177	4777	18288	41993	7880
State Government	78196	25203	52299	13531	115416	21382
Local Government	69525	24545	49439	13716	97475	20755
General Practice	251882	39980	16865	68113	237780	35255
Health Centre	145690	47798	66759	17630	280496	41986
Government Bodies	45817	16382	32489	8817	71993	14154
Government Institutions	36292	15358	38627	9048	75939	12707
Gym	5067	1359	1445	394	8291	1359
Functional Fitness	14455	2869	3485	1492	8624	2595
Fitness Club	1231	591	1029	343	2197	513
Hospital	126244	22731	32574	6595	222195	19931
Non-government Organisations	31615	13908	32829	8065	62250	11969
NGOs	8329	3360	10639	2496	12930	2734
Planetary Health	2780	1502	2166	827	3237	1317
Alternative Health	134787	44851	64804	18601	211499	39578

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Complementary Health	33686	11437	16581	5092	43574	10234
Integrative Health	69188	29400	14425	54254	131675	26035
Ecological Health	34644	17311	29784	10589	46788	15370
Emotional Health	17434	7990	19776	3216	78094	6829
Environment and Health	148492	51591	110433	26816	233253	45172
Geographies of Health	50197	26483	39457	12777	101773	23185
Public Health	99995	43343	76696	18945	251070	37322
Physical Health	137142	47039	64826	18709	233565	41246
Relational Ecology	936	353	856	248	1143	331
Social Dimensions of Health	15441	10528	24880	6139	56051	9253
Spiritual Health	2068	1532	5717	960	13025	1318
Wellbeing	4458	2766	7213	1781	14887	2379
Planning	235416	78228	110433	28816	518391	67855
Climate Change	127718	20142	37282	12315	60347	17670
Green Planning	64858	25471	34204	12490	81364	22916
Multi-Sector Planning	25160	11603	26894	7450	41480	10009

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Spatial Planning	84900	25776	26267	11785	61286	23069
Spatial Planning and Health	25776	25776	26267	11785	61286	23069
Planning Professionals	30097	19070	46164	8086	168424	16279
Architects	8667	2711	5120	1633	10080	2288
Designers	37980	4913	8082	2527	18519	4469
Urban Designers	5375	2161	3461	1460	5108	1920
Planners	18158	7442	10693	4116	23746	6220
Policy advisors	2684	1394	4472	854	8377	1217
Policy makers	30698	12056	28481	7364	53500	10454
Policy officers	6933	3829	10829	2087	26119	3255
applied	836115	48151	64874	18805	235242	44040
Applied-action	444714	33347	49987	14658	143256	30645
Barriers	227431	22661	39151	10774	106334	19880
Obstacles	66195	8525	16666	4445	40765	7504
Case studies	978576	65263	90081	23693	373217	57100
Collaborative	55177	11511	26915	5270	71928	10087
Decision-Making	109300	29641	61746	14336	168712	25974
Decision-Making Gaps	32349	11114	25273	6479	50384	9984
Decision-Making Translation	29289	9439	20437	5156	45233	8477

	High Density Development	High Density Development, planning and health	Environmental Sustainability, planning and health	High Density Development, Environmental Sustainability, planning and health	Methods, planning and health	High Density Development, Methods, Planning and Health
Evidence-based	560448	46716	66315	16455	267444	40469
Practice-relevant	138688	25970	50439	12179	147231	23307
Policy-relevant	55872	19630	44330	10883	97515	17201
Inter-institutional	72299	17289	35132	8641	90447	15188
Transdisciplinary	873	396	1362	315	1799	356
Public-Private Partnership	7944	4394	13912	3132	19419	3552
Translation	191540	18413	30341	7948	92713	16260
Sustainable communities	71036	21407	73233	18033	78815	18316
Sustainable Development	254983	34248	99330	26817	111600	29418
Sustainable Futures	2693	1128	4969	1044	4328	940
Sustainable Growth	153804	24186	62891	19899	65412	20721
Sustainable Urban Growth	28938	12088	27000	10897	24685	10102
Sustainable Planning	76087	34248	110435	26817	134756	29418
Tools	406320	38281	60859	16145	193452	34644

h. Sociological Abstracts

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Australia	1383	496	710	124	3157	403
NSW	126	53	100	17 saved	337	43 NA
New South Wales	543	278	224	17 saved	1084	243
Sydney	492	209	244	53 saved	1043	171
Victoria	555	232	241	38 saved	1211	191
Melbourne	450	200	231	50	973	165
Communit*	6162	2057	2234	467	14084	1621
Community garden	1062	463	440	135	1483	377
Local area	5106	1852	1969	446	9344	1463
Neighbour(s)/ hood	2746	1108	704	214	4516	894
Suburb	1042	494	206	84	1172	367
Precinct	102	39 saved	42 saved	10 saved	140	29 NA
Zone	1919	746	649	216	2353	572
Environment	5535	1935	2222	478	11315	1544
Built environment	2257	985	1067	264	3902	766
Sustainable environment	1547	717	1731	387	2754	552
Europe	3115	1019	992	215	5481	802

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
England	1998	726	574	121	4315	587
United Kingdom	1333	535	485	98 (mostly not relevant, few saved)	2826	450
Fitness professionals	120	37 saved	39 saved	9 saved	316	27 saved
Medical professionals	1050	522	386	77 saved	4709	449
Allied Health professional	158	104 saved	100	16 NA	560	82 saved
Physiotherapist	12 NA	7 saved	10 NA	0	82 saved	5 NA
Nutritionist	26 NA	6 NA	10 saved	3 NA	68 saved	6 NA
Dietician	10 NA	6 NA	4	1 NA	54	6 NA
Doctor	830	376	249	58 saved	3178	319
General Practitioner/GP	2014	384	459	89	3270	330
Naturopath	0	0	0	0	5	0
Nurse(s)	438	200	158	21 saved	2557	176
Metropolitan	1968	809	469	154	2845	655
Metro	331	159	79 saved	34	439	128
North America	2643	926	851	204	4392	735
Canada	1883	631	764	165	4151	493
United States	5254	1742	1734	366	11699	1394

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Organisations	5494	1786	2063	411	12087	1396
Commonwealth government	298	129	163	29 saved	744	104
Federal government	1789	706	671	135	3815	543
State government	4846	1786	1964	135	10105	1369
Local government	4137	1630	1856	414	8018	1260
General Practice	4727	1569	1745	370	11317	1266
Health Centre	3926	2010	1908	437	13283	1589
Government bodies	2395	961	1132	223	5583	768
Government institutions	3372	1261	1471	300	6837	954
Gym	77 NA	21 saved	17 saved	1 saved	194	17 saved
FUNCTIONAL FITNESS	102 saved	26 saved	19 saved	2 saved	155	19 saved
Fitness centre	219	66 saved	62 saved	14 saved	423	50 saved
Fitness club	53 saved	18 saved	20 saved	3 saved	119	14 NA
Hospital	1225	635	409	94 saved	4738	519
Non government organisations	3115	29 saved	1450	11 saved	6678	941

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Non-government organisations OR Non-government-organisations OR NGOs	14888	15336	14759	14863	15353	14793
Planetary health	80 saved	54	133	30	170	38 saved
Alternative health	2988	1513	1692	346	9681	1205
Complementary health	640	344	397	87 saved	1860	279
Integrative health	328	136	219	44 saved	1142	118
Ecological health	1551	839	1383	335	3199	677
Emotional health	1154	473	395	66 saved	5722	401
Environment and health	3600	1935	2222	478	11315	1174
Geographies of health	1567	1039	947	279	3434	846
Public health	4121	2062	2178	447	14556	1629
Physical health	2826	1456	1336	348	9535	1190
Relational ecology	237	75 saved	154	29	426	60 saved
Social dimensions of health	2636	1308	1420	327	8144	58 saved

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Spiritual health	478	283	336	66 saved	1740	240
Wellbeing	631	293	370	70 saved	2239	264
Planning	3372	2296	2399	492	17958	1807
Climate change	1965	757	1121	242	3380	593
Green planning	1125	819	1135	276	3374	643
Multi-sector planning	8	6 NA	16	4 saved	31 saved	4
Spatial planning	1637	1097	855	289	3206	902
Spatial planning and health	1097	1097	855	289	3206	902
Planning professionals	1447	1075	1066	204	8774	874
Architects	515	307	155	43 saved	816	242
Designers	242	96 saved	99	22 saved	574	72 saved
Urban Designers	183	89 saved	81 saved	21 saved	345	67 saved
Planners	812	477	420	116	1690	361
Policy	6062	2113	2293	478	14299	1666
Policy Advisors OR/Makers/ OrOfficers	39540	38680	39496	39459	39828	39477
Applied policy/ Or Applied action	38207	37359	37229	37096	39623	37364

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Barriers/ Obstacles to policy	17308	16337	16457	15993	19241	16257
Policy case studies	5544	2002	2085	458	12654	1604
Collaborative policy	592	294	489	85 saved	2088	237
Decision making	3902	1437	1705	358	10196	1146
Policy gaps	2405	914	992	217	5761	760
Policy translation	677	277	284	54 saved	1837	234
Evidence based policy	4416	1630	1507	340	10184	1341
Policy to practice	4395	1669	2022	423	11333	1331
Policy relevant / practice relevant	3311	47014	49631	46884	48092	47038
Inter-institutional policy	11 NA	6 NA	20 NA	3	50	5 NA
Transdisciplinary	51	71 saved	68	14	131	21 saved
Public private partnership	738	346	652	121	2191	250
Decision making	3902	1437	1705	358	10196	1146
Research / Researchers	7252	104247	104371	130554	110053	104073
Case studies	6880	2160	2152	469	14943	1727

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Evaluation	2658	947	1060	217	8297	799
Research gaps	2708	951	982	218	6357	793
methods	5689	1807	1706	387	17958	1807
review	6577	2056	2039	435	14809	1678
Translation	868	293	304	57	2153	247
Sustainable communities OR (resilient)	4900	4172	5044	3865	2899	4020
Sustainable development	1712	763	1808	394	3130	584
Sustainable futures	1431	674	1650	357	2753	525
Sustainable growth / urban growth	5269	4992	5308	30511	31165	4969
Sustainable planning	1079	763	1833	394	3194	584
Tools	2953	1022	1291	267	6865	852
Approaches	6218	2005	2162	459	14201	1618
Checklist	118 saved	41 saved	67 saved	13 saved	697	35 NA
Rating	639	210	195	48 saved	2226	180
Strategies	5317	1747	1965	424	12198	1390
Sustainable transport	584	284	560	170	747	207

	High Density Development	High Density Development (and planning and health)	Environmental Sustainability Planning and Health	High density development Environmental Sustainability Planning and Health	Methods Planning and Health	High density development Methods planning and health
Access	4767	1735	1762	404	10584	1399
Cyclist/Cycling	1403	1396	468	1397	1420	1396
Driver/Driving	22430	22038	22140	21891	23090	22015
Walking	757	322	261	84 saved	1588	249
Urban density/OR development/ OR growth/OR planning	76818	72700	76829	46464	76872	76873
Western countries	3155	1129	1083	52330	6122	899
Developed countries/ Or developed world	67640	1525	67238	83134	8555	51825
Neoliberal countries OR Neoliberal institutions	8252	8197	8239	9586	8354	8205

7.3 Appendix 3: Table 1 Showing inclusion and exclusion criteria developed to assess each article

The following criteria were applied to limit the inclusion pool to the articles most relevant for the purposes of the study

Inclusion Criteria - Main	Inclusion Criteria - detailed	Exclusion Criteria
Geographic level – macro (countries and continents)	**1.** Australia **2.** Asia **3.** Europe **4.** New Zealand **5.** North America **6.** Western developed countries	**1.** Africa **2.** South America **3.** Any developing countries where there is no link or comparison to any of the developed countries listed
Geographic level – micro (states and cities)	**1.** Brisbane **2.** Melbourne **3.** New South Wales **4.** Perth **5.** Sydney **6.** Victoria **7.** And/cities with high density	**1.** Any of same, relating only to low density
Geographic level - context	**1.** High density development **2.** Urban development **3.** Expanding urban development/sites	**1.** Rural only **2.** Remote **3.** Master planned estates **4.** Low/Medium density, unless compared to high density **5.** Suburban, unless compared/ discusses in relation to high density **6.** Small community case studies unless directly related to/compared to densely populated urban areas
Topic level - Transport	**1.** Types of transport – bus, train, tram, cycle, walking **2.** Road	**1.** Freeway/Highway

Inclusion Criteria - Main	Inclusion Criteria - detailed	Exclusion Criteria
Topic level - health	**1.** Relates to: **2.** Physical/emotional/spiritual health **3.** Medical model and CAM **4.** Socio-environmental determinant models of health **5.** Socio-ecological and relational approaches to health **6.** Public and Population Health **7.** Global Health **8.** Planetary Health **9.** Health, wellbeing, human flourishing, human happiness **10.** Planning in public health, health and sustainable livelihoods, **11.** Healthy human environment **12.** Co-benefits approach to human and environmental health **13.** Place and human health, **14.** Age and public health planning **15.** Collaborative/partnership working **16.** Cross-/inter-/multi-disciplinary/multi-sector approaches and health **17.** Health and **18.** Environment/Planning/Translation **19.** Fitness/Physical activity/Diet and nutrition	**1.** Disease prevention/healthcare with no reference to the built/living environment **2.** Sexual health **3.** Smoking **4.** Palliative care **5.** Breastfeeding **6.** Malnutrition **7.** End of life

Inclusion Criteria - Main	Inclusion Criteria - detailed	Exclusion Criteria
Topic level - environment	**1.** Focus on the built environment, **2.** Focus on the natural environment in relation to human livelihoods **3.** Relates to urban areas and humans	**1.** Does not relate to humans **2.** Non-urban environments **3.** Focus specifically on Marine environments with no reference to how this affects humans or no discussion of relationship between marine health and human health **4.** Coastal environment case studies with no reference or link to urban environment and/or population migration and/or food security **5.** Analysis of the geological environment only
Topic level – subsistence	**1.** Food **2.** Drink **3.** Food security/Food insecurity/ nutritional insecurity/under nutrition/malnutrition **4.** Community gardens	**1.** Does not relate to humans and/or the relationship between humans and environments (i.e. species nutrition case studies with no reference/links of how this relates to human diet/nutrition
Topic level – education	**1.** Students – any level **2.** Professionals **3.** Knowledge **4.** Understanding **5.** Widening perspective **6.** Practice-Orientated **7.** Inter-institutional research, practice and learning **8.** Inter-disciplinary approaches to problem solving	

Inclusion Criteria - Main	Inclusion Criteria - detailed	Exclusion Criteria
Topic level – actions, behaviours, values and emotions	**1.** Barriers/obstacles/denial/ challenges **2.** Feelings/Perceptions/Views **3.** Anxiety/Happiness/Stress/ Wellbeing **4.** Quality of life **5.** Resilience **6.** Emotionality/human flourishing **7.** Life satisfaction/quality of life **8.** Human security **9.** Affect **10.** Human interaction **11.** Inclusion/Integration/Socialisation	
Topic level - tools	**1.** Approaches **2.** Indicator **3.** Index **4.** Measure **5.** Model **6.** Predictor **7.** Rating **8.** Trials **9.** Toolkit	

Inclusion Criteria - Main	Inclusion Criteria - detailed	Exclusion Criteria
Topic level – population	**1.** General population **2.** Socioeconomic groups/inequality **3.** Children and young people **4.** Older people **5.** Adults (all ages) **6.** Refugees **7.** Rural-to-urban migrants **8.** Climate change refugees **9.** Employed/unemployed adults **10.** Elderly persons residing in care homes/retirement complexes/sheltered pensioner accommodation **11.** Persons with disabilities and/ or chronic medical conditions (physical and/or mental disabilities or ill-health)	**1.** Individuals with highly specific needs e.g. autistic people, unless part of the general inclusion criteria **2.** Indigenous people (unless part of the inclusion criteria) **3.** Animal populations unless pets living in human household or specifically focusing on relationships between humans and animals for quality of life, i.e. pet-keeping and designing urban environments for enhancing human wellbeing.
Topic level – governance	**1.** Policy **2.** Law **3.** Plan **4.** Report **5.** Government (any level) **6.** NGO **7.** Strategy **8.** Development **9.** Decision **10.** Decision-making **11.** Implementation **12.** Practice	

Inclusion Criteria - Main	Inclusion Criteria - detailed	Exclusion Criteria
Quality of the study - timeliness	Publications in the last 10 years were favoured, unless: **1.** A classic study **2.** Unique/rare content **3.** Specifically focused on high-density environments in theoretical/empirical studies **4.** Content directly focusing on relationship between urban planning, human health, population change and policy and practice with reference to high density environments	**1.** Publications that were older than 1990
Quality of the study – methodology	**1.** Where empirical, has a high quality methodological approach with key finding(s). **2.** Includes some kinds of discussion – for example: • Strengths/weaknesses, points for practice/implementation etc. - Comparative study - Critical Study - Case Study - Theoretical discussion - Approach evaluation/analysis - Practice piece - Interdisciplinary research methods - Inter-institutional research and/or - research involving multiple stakeholders	

Inclusion Criteria - Main	Inclusion Criteria - detailed	Exclusion Criteria
Quality of the study – theoretical	**1.** Related to a clearly defined philosophical position e.g. Neoliberalism **2.** Or evidence-based/empirical study used to support/evaluate existing theories and/or to suggest new contributions to knowledge and/or understandings **3.** Questioning of particular theoretical/philosophical positions through research frameworks and/or empirical evidence	

7.4 Appendix 4: Article Coding Framework

For each article, the journal, journal FoR 1 and FoR 2 (Field of Research) names are provided, in addition to the theoretical perspective of health that it has been grouped under. The FoR 1 and FoR 2 names were taken from the ERA 2015 Journal List.

FoR 1 stands for the primary field of research, whereas FoR 2 stands for any secondary field of research to which the journal also applies.

For inclusion on the ERA 2015 Journal List, the journal had to meet all of the following criteria: a) be academic/scholarly; b) publish original peer reviewed research; c) have one or more ISSNs; and d) have been active during the ERA 2015 reference period for research outputs. Consequently, any journal which was not active the time is listed as Unclassified. A code of N/A for Not Applicable has been provided for academic reports, conference proceedings and academic opinion pieces where the published source lies outwith the ERA inclusion criteria. FoR 2 code names have only been provided where they have been listed in the ERA 2015 Journal List.

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Acioly and Davidson 1996	S-E determinants	Building Issues	Architecture	Building
Allen and Blandy 2004	S-E determinants	Urban Policy	Urban & Regional Planning	Human Geography
Anderson 2009	S-E determinants	Emotion, Space and Society	Cultural Studies	Sociology
Astell-Burt et al., 2014	S-E determinants	Bmc Public Health	Public Health and Health Services	
Badland et al., 2017	S-E determinants	Health and Place	Public Health and Health Services	Human Geography
Badland et al., 2013	S-E determinants	Int. Journal of Health Geographics	Human Geography	
Badland et al., 2015	S-E determinants	Environment and Planning B: Planning and Design	Design Practice And Management	Urban and Regional Planning
Barthel et al., 2010	Planetary Health	Global Environmental Change	Multidisciplinary	
Barton 2009	Public Health	Land Use Policy	Multidisciplinary	
Bellamy et al., 2017	Planetary Health	Environmental Research	Chemical Sciences	Environmental Sciences
Beer and Faulkner 2009	S-E determinants	Australian Housing Research Institute	Urban and Regional Planning	
Bunker and Holloway 2007	Public Health	Australian Planner	Urban and Regional Planning	Environmental Science and Management
Bunker et al., 2002	S-E determinants	Urban Policy and Research	Urban and Regional Planning	Human Geography
Buys and Miller 2012	S-E determinants	Journal of Environmental Planning and Management	Multidisciplinary	
Carmona 2014	S-E determinants	Journal of Urban Design	Urban And Regional Planning	Architecture
Chan and Lee 2008	S-E determinants	Social Indicators Research	Sociology	
Chan and Lui 2018	S-E determinants	Building and Environment	Architecture	Building
Cho et al., 2017	S-E determinants	Journal of Urban Design	Urban And Regional Planning	Architecture
Christian et al., 2017	S-E determinants	Health and Place	Public Health And Health Services	Human Geography
Costello et al., 2005	S-E determinants	Child Adolesc Psychiatr Clin N Am	Clinical Sciences	
Cowie et al., 2016	S-E determinants	Environmental Health	Environmental Sciences	Biological Sciences
Crommelin et al., 2017	S-E determinants	Built Environment for Shelter	N/A	

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Davern et al., 2017	Planetary Health	The Conversation	N/A	
Diener and Suh 1997	S-E determinants	Social Indicators Research	Sociology	
Dodson 2010	S-E determinants	Urban Policy and Research	Urban and Regional Planning	Human Geography
Duff 2012	S-E determinants	Health and Place	Public Health And Health Services	Human Geography
Easthope and Judd 2010	Public Health & S-E determinants	Shelter NSW	N/A	
Easthope and Randolph 2008	Public Health	Housing Studies	Urban and Regional Planning	Applied Economics
Emmanuel and Steemers 2018	Planetary Health	Building Research and Information	Architecture	Building
Ewing et al., 2007	S-E determinants	Health and Place	Public Health And Health Services	Human Geography
Ewing and Rong 2008	S-E determinants	Housing Policy Debate	Urban And Regional Planning	Policy and Administration
Ewing et al., 2003	S-E determinants	Am J. Health Promotion	Urban And Regional Planning	Curriculum and Pedagogy
Falconer and Richardson 2010	S-E determinants	Australian Planner	Urban and Regional Planning	Environmental Science and Management
Feng et al., 2010	S-E determinants	Health and Place	Public Health And Health Services	Human Geography
Feng et al., 2017	S-E determinants	PLoS ONE	Multidisciplinary	
Fincher 2004	S-E determinants	Australian Geographical Studies	Human Geography	Physical Geography And Environmental Geoscience

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Fitzgerald et al., 2016	S-E determinants	British Journal of Sociology	Sociology	
Flood 1997	Public Health	Urban Studies	Urban and Regional Planning	Applied Economics
Forster 2006	S-E determinants	Geographical Research	Multidisciplinary	
Foster et al., 2015	S-E determinants	Journal of Environmental Psychology	Multidisciplinary	
Forsyth et al., 2007	S-E determinants	Urban Studies	Urban and Regional Planning	Applied Economics
Gifford 2007	S-E determinants	Architectural Science Review	Architecture	Building
Giles-Corti et al., 2012	Public Health & S-E Determinants	Cities and Health	Multidisciplinary	
Giles-Corti et al., 2014	S-E determinants	Public Health Research in Practice	Public Health and Health Services	
Giles-Corti et al., 2016	Public Health	The Lancet	Medical and Health Sciences	
Giridharan et al., 2004	Planetary Health	Energy and Building	Engineering	Built Environment and Design
Giskes and van Lenthe 2011	S-E determinants	Obesity Reviews	Medical and Health Sciences	Psychology and Cognitive Sciences
Gomez-Jacinto and Hombrados-Mendieta 2002	S-E determinants	Journal of Environmental Psychology	Multidisciplinary	
Grant et al., 2017	Public Health	Cities and Health	Multidisciplinary	
Greenwald and Boarnet 2001	S-E determinants	Transportation Research Record	Civil Engineering	Urban and Regional Planning

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Gunn et al., 2017	S-E determinants	International Journal of Behaviour Nutrition and Physical Activity	Medical And Health Sciences	Education
Guo et al., 2017	S-E determinants	Procedia Engineering	Engineering	
Haarhoff et al., 2016	S-E determinants	Cogent Social Sciences	Other studies in Human Society	
Haigh et al., 2011	S-E determinants	UNSW	N/A	
Hancock 2017	S-E determinants	Cities and Health	Multidisciplinary	
Hanlon et al., 2012	Public Health	Perspectives in Public Health	Public Health And Health Services	
He et al., 2011	S-E determinants	Int. J Behav Nutr Phys Activ	Medical and Health Sciences	Education
Heath et al. 2006	S-E determinants	Journal of Physical Activity and Health	Human Movement and Sports Science	Curriculum and Pedagogy
Holliday 2006	S-E determinants	Creating Child Friendly Cities Conference	N/A	
Holman et al., 2015	S-E determinants	Progress in Planning	Urban And Regional Planning	
Holmes et al., 2016	Planetary Health	Building Research and Information	Architecture	Building
Howley and Scott 2009	S-E determinants	J of Env Planning and Management	Multidisciplinary	
Hu et al., 2016	S-E determinants	Procedia Engineering	Engineering	
Jabareen 2006	S-E determinants	J of Planning Education and Research	Urban and Regional Planning	Human Geography

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Johnson-Lawrence et al 2015	S-E determinants	Annals of Epidemiology	Medical and Health Sciences	
Jowell et al., 2017	Planetary Health	The Lancet Planetary Health	Medical and Health Sciences	
Kalcheva et al., 2015	S-E determinants	Procedia Social and Behavioural Sciences	Other studies in Human Society	
Kane and Whitehead 2018	S-E determinants	Australian Planner	Urban and Regional Planning	Environmental Science and Management
Kazmierczak 2013	S-E determinants	Landscape and Urban Planning	Engineering	Environmental Sciences
Kent and Thompson 2014	S-E determinants	Journal of Planning Literature	Urban And Regional Planning	
Kent 2015	S-E determinants	The Conversation	N/A	
Kent et al., 2017	S-E determinants	Cities and Health	Multidisciplinary	
King 2018	Public Health	J of Urban Design and Mental Health	Urban And Regional Planning	
Kitahara 2018	S-E determinants	N/A	N/A	
Kleerekoper et al., 2012	Planetary Health	Resources, Conservation and Recycling	Environmental Sciences	Engineering
Komossa 2011	S-E determinants	Architecture and Education Journal	Architecture	
Leal and Chaix 2011	S-E determinants	Obesity Reviews	Medical and Health Sciences	Psychology and Cognitive Sciences

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Lee and Braham 2017	Planetary Health	Ecological Modelling	Multidisciplinary	
Lee et al., 2015	Planetary Health	International Journal of Low-Carbon Technologies	Multidisciplinary	
Lloyd et al., 2016	S-E determinants	Urban Policy and Research	Urban and Regional Planning	Human Geography
Lotfabadi 2014	Planetary Health	Renewable and Sustainable Energy Reviews	Environmental Science and Management	
Lotfi and Koohsari 2009	S-E determinants	Social Indicators Research	Sociology	
Lowe et al., 2015	S-E determinants	Urban Policy and Research	Urban and Regional Planning	Human Geography
Lu and Ye 2017	S-E determinants	Preventative Medicine	Public Health And Health Services	
Lusher et al., 2008	S-E determinants	N/A	N/A	
Marans and Cooper 2000	S-E determinants	Int Conference on Quality of Life	Unclassified	
Matan et al., 2015	S-E determinants	Urban Policy and Research	Urban and Regional Planning	Human Geography
McCrea and Walters 2012	S-E determinants	Housing, Theory and Society	Urban And Regional Planning	Sociology
Mirzaei 2015	Planetary Health	Sustainable Cities and Society	Environmental Science and Management	Urban and Regional Planning
Moudon and Lee 2003	S-E determinants	Am J Health Promotion	Urban And Regional Planning	
Ng et al. 2012	Planetary Health	Building and Environment	Architecture	Building

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Nicholls et al., 2017	S-E determinants	N/A	N/A	
Nissen 2008	S-E determinants	Czech Sociological Review	Unclassified	
Ormandy and Ezratty 2016	S-E determinants	Advances in Building Energy Research	Engineering	
Paciencia and Moreira 2017	S-E determinants	The Lancet Planetary Health	Medical and Health Sciences	
Pacione 2003	S-E determinants	Urban Geography	Urban And Regional Planning	Human Geography
Pattanayak and Haines 2017	Planetary Health	The Lancet Planetary Health	Medical and Health Sciences	
Perini and Magliocco 2014	Planetary Health	Urban Forestry and Urban Greening	Forestry Sciences	
Pomeroy 2011	S-E determinants	Journal of Urban Design	Urban And Regional Planning	Architecture
Quastel et al., 2012	S-E determinants	Urban Geography	Urban And Regional Planning	Urban and Regional Planning
Quigley and Ball 2007	S-E determinants	N/A	N/A	
Randolph and Holloway 2005	Public Healths	Urban Policy and Research	Urban and Regional Planning	Urban and Regional Planning
Randolph and Tice 2013	S-E determinants	Urban Studies	Urban and Regional Planning	Applied Economics
Redman and Jones 2005	Public Health	Population and Environment	Environmental Sciences	Studies in Human Society

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Reid et al., 2017	S-E determinants	Australian Planner	Urban and Regional Planning	Environmental Science and Management
Ren et al., 2013	Planetary Health	Cities	Urban and Regional Planning	Human Geography
Roulet et al., 2006	S-E determinants	Building Research and Information	Architecture	Building
Sherry and Easthope 2016	S-E determinants	Cities	Urban and Regional Planning	Human Geography
Searle 2007	Public Health	Urban Research Program	Urban And Regional Planning	Urban and Regional Planning
Seo 2002	S-E determinants	Cities	Urban and Regional Planning	Human Geography
Seo and Chiu 2014	S-E determinants	Housing Studies	Urban and Regional Planning	Applied Economics
Setti 2013	S-E determinants	J of Civil Engineering and Architecture	Psychology	Architecture
Sharp 2003	S-E determinants	Journal of Urban Health	Public Health and Health Services	
Sherry and Easthope 2016	S-E determinants	Cities	Urban and Regional Planning	Human Geography
Shi 2017	S-E determinants	Procedia Engineering: Urban Transitions Conference	Engineering	
Shi et al., 2018	Planetary Health	Building and Environment	Unclassified	
Soderstrom et al., 2016	S-E determinants	Health and Place	Public Health And Health Services	Human Geography

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Song and Knaap 2004	S-E determinants	Regional Science and Urban Economics	Urban And Regional Planning	Applied Economics
Speak et al., 2012	Planetary Health	Atmospheric Environment	Environmental Engineering	Atmospheric Sciences
Strath and Greenwald 2007	S-E determinants	J of Aging Physical Activity	Human Movement And Sports Science	
Talen 2006	S-E determinants	Journal of Urban Design	Urban And Regional Planning	Architecture
Tan et al., 2016	Planetary Health	Energy and Buildings	Engineering	Built Environment and Design
Taylor et al. 2016	S-E determinants	N/A	N/A	
Thompson 2013	S-E determinants	Journal of Environmental Psychology	Multidisciplinary	
Thomspon et al., 2014	S-E determinants	Health Promotion Journal of Australia	Public Health and Health Services	
Thompson and Paine 2017	S-E determinants	The Conversation	N/A	
Turner and Wigfield 2017	S-E determinants	The Conversation	N/A	
Udell et al., 2014	S-E determinants	Heart Foundation	N/A	
Vandentorren et al., 2016	S-E determinants	European Journal of Public Health	Public Health and Health Services	
Van Kamp et al 2003	S-E determinants	Landscape and Urban Planning	Engineering	Environmental Sciences

Article	Theoretical perspective of health	Journal	Journal FoR 1	Journal FoR 2
Vassos et al., 2012	S-E determinants	Schizophrenia Bulletin	Medical and Health Sciences	Psychology and Cognitive Sciences
Villanueva et al., 2016	S-E determinants	Academic Pediatrics	Paediatrics And Reproductive Medicine	
Watts et al., 2015	Planetary Health	The Lancet	Medical and Health Sciences	
Wells et al., 2010	Public Health	J of Architecture and Planning Research	Urban and Regional Planning	
Wener and Carmalt 2006	S-E determinants	Technology in Society	Sociology	
Wilson et al., 2015	S-E determinants	Journal of Environment, Policy and Planning	Environmental Science and Management	Urban and Regional Planning
Yan and Voorhees 2010	S-E determinants	International Joint Ventures of Practice and Theory	Unclassified	
Yang 2008	S-E determinants	J of American Planning Association	Urban And Regional Planning	
Yung et al., 2017	S-E determinants	Landscape and Urban Planning	Engineering	Environmental Sciences
Zhang et al., 2012	S-E determinants	Automation in Construction	Engineering	Built Environment and Design
Zhang and Lawson 2009	S-E determinants	Urban Design International	Urban And Regional Planning	

7.5 Appendix 5: List of articles grouped under each theoretical perspective of health

Total number of articles within the sample: 141

Global Public Health (Total: 14 out of 141)

Barton, H., 2009. '*Land use planning and health and wellbeing*'. Land use policy, vol. 26 (Suppl), S115–S123.

Bunker, R. and Holloway, D. 2007, "*How far and in what way is Sydney's new Metropolitan strategy likely to be implemented?*" Australian Planner, Vol. 44, no 1, pp. 26-33

Easthope, H., and Judd, S., 2010. *Living well in greater density*, Shelter NSW and City Futures, Sydney.

Easthope, H. & Randolph, B. 2009, '*Governing the Compact City: The Challenges of Apartment Living in Sydney, Australia*', Housing Studies, vol. 24, no. 2, pp. 243-59.

Flood, J. 1997, '*Urban and Housing Indicators*', Urban Studies, vol. 34, no. 10, pp. 1635-65.

Giles-Corti, B.K.R., Dr Sarah Foster, 2012, *Increasing density in Australia: maximising the health benefits and minimising harm*, National Heart Foundation of Australia.

Giles-Corti, B., Badland, H., Mavoa, S., Turrell, G., Bull, F., Boruff, B., Pettit, C., Bauman, A., Hooper, P., Villaneuva, K., Astell-Burt, T., Feng, X., Learnihan, V., Davey, R., Grenfell, R. & Thackway, S. 2014, '*Reconnecting Urban Planning with Health: A Protocol for the Development and Validation of National Liveability Indicators Associated with Noncommunicable Disease Risk-Behaviours and Health Outcomes*', Public Health Research in Practice, vol. 25, no. 1.

Grant, M., Brown, C., Caiaffa, W.T., Capon, A., Corburn, J., Coutts, C., Crespo, C.J., Ellis, G., Ferguson, G., Fudge, C., Hancock, T., Lawrence, R.J., Nieuwenhuijsen, M.J., Oni, T., Thompson, S., Wagenaar, C. & Ward Thompson, C. 2017, '*Cities and health: an evolving global conversation*', Cities & Health, vol. 1, no. 1, pp. 1-9.

Hanlon, P., Carlisle, S., Hannah, M., Lyon, A. & Reilly, D. 2012, '*A perspective on the future public health: an integrative and ecological framework*', Perspectives in Public Health, vol. 132, no. 6, pp. 313-9.

King, J. 2018, "*Air Pollution, Mental Health, and Implications for Urban Design: A Review*" Journal of Urban Design and Mental Health, Vol. 6, no. 6.

Randolph, B. & Holloway, D. 2005, '*Social Disadvantage, Tenure and Location: An Analysis of Sydney and Melbourne*', Urban Policy and Research, vol. 23, no. 2, pp. 173-201.

Redman, C. L. and N. S. Jones. 2005. '*The Environmental, Social, and Health Dimensions of Urban Expansion*'. Population and Environment, Vol. 26, no. 6, pp. 505-20

Searle, G. 2007 *Sydney's Urban Consolidation Experience: Power, politics and Community*. Urban Research Program Research Paper 12, Griffith University, Brisbane

Wells, N. M., Evans, G. W., 2010, '*Environments and health: planning decisions as public-health decisions*', Journal of Architecture and Planning Research, vol. 27, no. 2, pp.124-143.

Socio-Ecological Determinants of Health (Total: 109 out of 141)

Acioly, C., and Davidson, F., 1996, "*Habitat II.- Density in Urban Development.*", Building Issues, vol. 3, no. 8, pp. 8-11

Allen, C. & Blandy, S. 2004. *The Future of City Centre Living: Implications for Urban Policy*, London: Department for Communities and Local Government

Anderson, B. 2009, '*Affective Atmospheres.*', Emotion, Space and Society., vol. 2, no. 2. pp. 77-81.

Astell-Burt, T., Feng, X.Q., Mavoa, S., Badland, H.M. & Giles-Corti, B. 2014, '*Do low-income neighbourhoods have the least green space? A cross-sectional study of Australia's most populous cities*', Bmc Public Health, vol. 14.

Badland, H., Foster, S., Bentley, R., Higgs, C., Roberts, R., Pettit, C. & Giles-Corti, B. 2017, '*Examining associations between area-level spatial measures of housing with selected health and wellbeing behaviours and outcomes in an urban context*', Health & Place, vol. 43, pp. 17-24.

Badland, H., White, M., MacAulay, G., Eagleson, S., Mavoa, S., Pettit, C. & Giles-Corti, B. 2013, '*Using simple agent-based modeling to inform and enhance neighborhood walkability*', International Journal of Health Geographics, vol. 12.

Badland, H. M., P. Donovan, S. Mavoa, M. Oliver, M. Chaudhury, and K. Witten. 2015. "*Assessing Neighbourhood Destination Access for Children: Development of the NDAI-C Audit Tool.*" Environment and Planning B: Planning and Design, Vol. 42.

Beer, A., and Faulkner, D. 2009, *21st century housing careers and Australia's housing future, AHURI Final Report No. 128, Australian Housing and Urban Research Institute Limited*, Melbourne, https://www.ahuri.edu.au/research/final-reports/128

Bunker, R., Gleeson, B., Holloway, D and Randolph, B., 2002, *The Local Impacts of Urban Consolidation, Urban Policy and Research*, vol. 20, no. 2, pp. 143–167.

Buys, L. & Miller, E. 2012, '*Residential satisfaction in inner urban higher-density Brisbane, Australia: role of dwelling design, neighbourhood and neighbours*', Journal of Environmental Planning and Management, vol. 55, no. 3, pp. 319-38.

Carmona, M., 2014, *The Place-shaping Continuum: A Theory of Urban Design Process, Journal of Urban Design*, vol. 19, no. 1, pp. 2-36,

Chan, E., & Lee, G. 2008. '*Critical factors for improving social sustainability of urban renewal projects*', Social Indicators Research, vol. 85, pp. 243-256.

Chan, I. Y. S., & Lui, A. M. M., 2018, '*Effects of neighbourhood on building design, height, greenspace, and cleanliness on indoor environment and health of building occupants*', Building and Environment, vol. 145, pp. 213-222.

Cho, I.S., Trivic, Z. & Nasution, I. 2017, '*New high-density intensified housing developments in Asia: qualities, potential and challenges*', Journal of Urban Design, vol. 22, no. 5, pp. 613-36

Christian, H., Ball, S.J., Zubrick, S.R., Brinkman, S., Turrell, G., Boruff, B. & Foster, S. 2017, '*Relationship between the neighbourhood built environment and early child development*', Health and Place, vol. 48, pp. 90-101.

Costello, E.J., Egger, H.L. & Angold, A. 2005, '*The developmental epidemiology of anxiety disorders: phenomenology, prevalence, and comorbidity*', Child Adolesc Psychiatr Clin N Am, vol. 14, no. 4, pp. 631-48, vii.

Cowie, C.T., Ding, D., Rolfe, M.I., Mayne, D.J., Jalaludin, B., Bauman, A. & Morgan, G.G. 2016, '*Neighbourhood walkability, road density and socio-economic status in Sydney, Australia*', Environmental Health, vol. 15.

Crommelin, L.A., Easthope, H. & Troy, L. 2017, *Equitable Density: The Place for Lower Income and Disadvantaged Households in a Dense City: Report 2, The Neighbourhood Scale*, University of New South Wales, Sydney, City Futures Research Centre, UNSW Built Environment for Shelter NSW Department of Family and Community Services

Diener, E., & Suh, E. 1997, '*Measuring quality of life: Economic, social and subjective indicators*'. Social Indicators Research, vol. 40, pp. 189–216.

Dodson, J. 2010, '*In the wrong place at the wrong time? Assessing some planning, transport and housing market limits to urban consolidation*'. Urban Policy and Research, vol. 28, pp. 497–504.

Duff, C. 2012, '*Exploring the role of 'Enabling Places' in promoting recovery from mental illness: A qualitative test of a relational model.*' Health and Place, vol. 18, no. 6, pp.1388–1395.

Easthope, H., and Judd, S., 2010. *Living well in greater density, Shelter NSW and City Futures*, Sydney.

Ewing, R., Meakins, G., Hamidi, S., & Nelson, A. C. 2007, '*Relationship between urban sprawl and physical activity, obesity, and morbidity—Update and refinement*'. Health and Place, vol. 26, pp. 118–126.

Ewing, R. & Rong, F. 2008, '*The impact of urban form on U.S. residential energy use*', Housing Policy Debate, vol. 19, no. 1, pp. 1-30.

Ewing R, Schmid T, Killingsworth R, Zlot A, Raudenbush S. 2003, '*Relationship between urban sprawl and physical activity, obesity and morbidity*'. Am J Health Promot, vol. 18, no. 1, pp. 47-57.

Falconer, R., & Richardson, E. 2010. '*Rethinking urban land use transport planning—opportunities for transit oriented development in Australian cities: case study Perth.*' Australian Planner, vol. 47, pp. 1–13.

Feng, J., Glass, T. A., Curriero, F. C., Stewart, W. F., Schwartz, B. S., 2010, '*The built environment and obesity: a systematic review of the epidemiologic evidence*', Health and Place, vol. 16, no. 2, pp. 175-190.

Feng X, Feng Z, Astell-Burt T. 2017, '*Perceived public transport infrastructure modifies the association between public transport use and mental health*'. PLoS ONE, vol. 12, no. 8: e0180081.

Fincher, R. 2004, '*Gender and Life Course in the Narratives of Melbourne's High-rise Housing Developers*', Australian Geographical Studies, vol. 42, no. 3, pp. 325-38.

Fitzgerald, D., Rose, N., Singh, I., 2016, '*Revitalizing sociology: Urban life and mental illness between history and the present*', British Journal of Sociology, vol. 67, no. 1, pp.138–160

Forster, C. 2006, "*The Challenge of Change: Australian cities and urban planning in the new millennium*", Geographical Research, vol. 44, no. 2, pp.173-182.

Foster S, Wood L, Francis J, Knuiman M., 2015, '*Suspicious minds: Can features of the local neighbourhoods ease parents*' fears about stranger danger?' Journal of Environmental Psychology. Vol. 42, pp. 48-56

Forsyth, A., Oakes, M., Schmitz, K., Hearst, A., 2007. '*Does residential density increase walking and other physical activity?*' Urban Studies, vol. 44, pp. 679–697.

Gifford, R., 2007, '*The consequences of living in high-rise buildings*', Architectural Science Review, vol. 50, no. 1, pp.2-17

Giles-Corti, B.K.R., Dr Sarah Foster, 2012, *Increasing density in Australia: maximising the health benefits and minimising harm*, National Heart Foundation of Australia.

Giles-Corti, B., Badland, H., Mavoa, S., Turrell, G., Bull, F., Boruff, B., Pettit, C., Bauman, A., Hooper, P., Villaneuva, K., Astell-Burt, T., Feng, X., Learnihan, V., Davey, R., Grenfell, R. & Thackway, S. 2014, '*Reconnecting Urban Planning with Health: A Protocol for the Development and Validation of National Liveability Indicators Associated with Noncommunicable Disease Risk-Behaviours and Health Ootcomes*', Public Health Research in Practice, vol. 25, no. 1.

Giskes, K., van Lenthe, F., 2011, '*A systematic review of environmental factors and obesogenic dietary intakes among adults: are we getting closer to understanding obesogenic environments?*' Obesity Reviews, vol. 12, no. 5, e95-e106.

Gomez-Jacinto, L. & Hombrados-Mendieta, I. 2002, '*Multiple effects of community and household crowding*'. Journal of Environmental Psychology, vol. 22, pp. 233-246.

Greenwald, M., Boarnet, M., 2001. '*Built Environment as Determinant of Walking Behavior: Analyzing Nonwork Pedestrian Travel in Portland, Oregon*', Transportation Research Record: Journal of the Transportation Research Board, vol. 1780

Gunn, L.D., Mavoa, S., Boulange, C., Hooper, P., Kavanagh, A. & Giles-Corti, B. 2017, '*Designing healthy communities: creating evidence on metrics for built environment features associated with walkable neighbourhood activity centres*', International Journal of Behavioral Nutrition and Physical Activity, vol. 14

Guo, F., Zhua, P., Wanga, S., Duana, D., Yun, J., 2017, '*Improving Natural Ventilation Performance in a High-Density Urban District: A Building Morphology Method*', Proceedings from the 10th International Symposium on Heating, Ventilation and Air Conditioning, 1922 October 2017, Procedia Engineering, vol. 205, pp. 952–958

Haarhoff, E., Beattie, L. & Dupuis, A. 2016, '*Does higher density housing enhance liveability? Case studies of housing intensification in Auckland*', Cogent Social Sciences, vol. 2, no. 1, p. 1243289.

Haigh, F., Ng Chok, H. & Harris, P. 2011, *Housing Density and Health: A Review of the Literature and Health Impact Assessments*, University of New South Wales, Sydney. Centre for Health Equity Training, Research and Evaluation (CHETRE).

Hancock, T. 2017, '*Equity, sustainability and governance: key challenges facing 21st century cities (Part 1)*', Cities & Health, vol. 1, no. 1, pp. 95-9

He, C., et al. 2011, *How important is the land use mix measure in understanding walking behaviour?* Results from the RESIDE study. Int J Behav Nutr Phys Activ. Vol. 8, pp. 55–5.

Heath, G. B., Brownson, R. C., Kruger, J., Miles, R., Powell, K. E., Ramsey, L. T., and the Task Force on Community Preventive Service, 2006, '*The Effectiveness of Urban Design and Land Use and Transport Policies and Practices to Increase Physical Activity: A Systematic Review*', Journal of Physical Activity and Health, Vol. 3, Supplement 1, S55-S76

Holliday, S., 2006, *Creating child friendly communities - challenges for the planning profession*. Creating Child Friendly Cities Conference, Sydney

Holman, N., Mace, A., Paccoud, A. & Sundaresan, J. 2015, '*Coordinating density; working through conviction, suspicion and pragmatism*', Progress in Planning, vol. 101, pp. 1-38

Howley, P., Scott, M., 2009, '*Sustainability versus liveability: an investigation of neighbourhood satisfaction*', Journal of Environmental Planning and Management, vol. 52, no. 6, pp.847-864.

Hu, Y., White, M., & Ding, W., 2016, '*An urban form experiment on urban heat island effect in high density area*', Procedia Engineering, vol. 169, pp. 166-174.

Jabareen, Y.R. 2006, '*Sustainable Urban Forms: Their Typologies, Models, and Concepts*', Journal of Planning Education and Research, vol. 26, no. 1, pp. 38-52

Johnson-Lawrence, V., Schulz, A.J., Zenk, S.N., Israel, B.A. & Rowe, Z. 2015, '*Does territoriality modify the relationship between perceived neighborhood challenges and physical activity? A multilevel analysis*', Annals of epidemiology, vol. 25, no. 2, pp. 107-12

Kalcheva, E., Taki, A. & Hadi, Y. 2015, '*Sustainability high-rises in a sustainable development - the case of Salford Quays*', Procedia Social and Behavioural Sciences, vol. 216, pp. 960-73.

Kane, M. & Whitehead, J. 2018, '*How to ride transport disruption –a sustainable framework for future urban mobility*', Australian Planner, pp. 1-9.

Kaźmierczak, A. 2013, '*The contribution of local parks to neighbourhood social ties*', Landscape and Urban Planning, vol. 109, no. 1, pp. 31-44.

Kent, J.L. & Thompson, S. 2014, '*The Three Domains of Urban Planning for Health and Well-being*', Journal of Planning Literature, vol. 29, no. 3, pp. 239-56.

Kent, J. 2015, '*Higher-Density Living can make us healthier, but not on its own*', The Conversation, Jan 29 2015.

Kent, J.L., Ma, L. & Mulley, C. 2017, '*The objective and perceived built environment: What matters for happiness?*' Cities & Health, vol. 1, no. 1, pp. 59-71.

Kitahara, T. 2018, *Conserving the Walkable Environment in the Neighbourhood: A Case Study of the Improvement Effort in Kyojima*, Tokyo.

Komossa, S. 2011. "*Researching and Designing GREAT; the Extremely Condensed Hybrid Urban Block.*" Architecture & Education Journal, vol. 5, pp. 27–36

Leal, C., Chaix, B., 2011, '*The influence of geographic life environments on cardiometabolic risk factors: a systematic review, a methodological assessment and a research agenda*', Obesity Reviews, vol. 12, no. 3, pp.217-230.

Lloyd, K., Fullagar, S. & Reid, S. 2016, '*Where is the 'Social' in Constructions of 'Liveability'? Exploring Community, Social Interaction and Social Cohesion in Changing Urban Environments*', Urban Policy and Research, vol. 34, no. 4, pp. 343-55.

Lotfi, S. & Koohsari, M.J. 2009, '*Analyzing Accessibility Dimension of Urban Quality of Life: Where Urban Designers Face Duality Between Subjective and Objective Reading of Place*', Social Indicators Research, vol. 94, no. 3, pp. 417-35.

Lowe, M., Whitzman, C., Badland, H., Davern, M., Aye, L., Hes, D., Butterworth, I. & Giles-Corti, B. 2015, '*Planning Healthy, Liveable and Sustainable Cities: How Can Indicators Inform Policy?*', Urban Policy and Research, vol. 33, no. 2, pp. 131-44.

Lu, Y.X., Yu Ye 2017, '*Urban density, diversity and design: Is more always better for walking? A study from Hong Kong*', Preventive Medicine, vol. Volume 103, Supplement, pp. S99-S103.

Lusher, L., Seaman, M. & Tsay, S.-P. 2008, *Streets to Live By: How Liveable Street Design can Bring Economic, Health and Quality of Life to New York City*, Transit.Org, New York

Marans, R.W., & Couper, M. 2000, '*Measuring the quality of community life: A program for longitudinal and comparative international research (vol. 2)*'. Proceedings of the 2nd International Conference on Quality of Life, Singapore

Matan, A., Newman, P., Trubka, R., Beattie, C. & Selvey, L.A. 2015, '*Health, Transport and Urban Planning: Quantifying the Links between Urban Assessment Models and Human Health*', Urban Policy and Research, vol. 33, no. 2, pp. 145-59

McCrea, R., & Walters, P. 2012, '*Impacts of urban consolidation on urban liveability: Comparing an inner and outer suburb in Brisbane, Australia*'. Housing, Theory and Society, Vol. 29, pp. 190– 206.

Moudon, A.V. & Lee, C. 2003, '*Walking and bicycling: an evaluation of environmental audit instruments*', Am J Health Promot, vol. 18, no. 1, pp. 21-37.

Nicholls, L., McCann, H., Strengers, Y., & Bosomworth, K., 2017. *Electricity pricing, heatwaves and household vulnerability in Australia*. Melbourne: Centre for Urban Research, RMIT Australia.

Nissen, Sylke. 2008. "*Urban Transformation from Public and Private Space to Spaces of Hybrid Character.*" Czech Sociological Review, vol. 44, no. 6, pp. 1129–1149

Ormandy, D., & Ezratty, V., 2016, '*Thermal discomfort and health: protecting the susceptible from excess cold and excess heat in housing*', Advances in Building Energy Research, vol. 10, no. 1, pp. 84-98.

Paciência, I. & Moreira, A. 2017, '*Human health: is it who you are or where you live?*', The Lancet Planetary Health, vol. 1, no. 7, pp. e263-e4.

Pacione, M. 2003, '*Quality-of-life research in urban geography*'. Urban Geography, vol. 24, pp. 314–339.

Pomeroy, J. 2011, '*Defining Singapore Public Space: From Sanitization to Corporatization*', Journal of Urban Design, vol. 16, no. 03, pp. 381-9

Quastel, N., Moos, M., & Lynch, N. 2012, '*Sustainability-as-density and the return of the social: The case of Vancouver, British Columbia.*' Urban Geography, vol. 33, pp. 1055– 108

Quigley, R., and Ball, J., 2007, *Wellbeing Assessment of the Draft Far North District Council Kerikeri-Waipapa Structure Plan*, Quigley and Watts Pty Ltd. Public Health Specialist.

Randolph, B. & Tice, A. 2013, '*Who Lives in Higher Density Housing? A Study of Spatially Discontinuous Housing Sub-markets in Sydney and Melbourne*', Urban Studies, vol. 50, no. 13, pp. 2661-81.

Reid, S., Lloyd, K. & O'Brien, W. 2017, '*Women's perspectives on liveability in vertical communities: a feminist materialist approach*', Australian Planner, vol. 54, no. 1, pp. 16-23.

Roulet, C-A., Flourentzou, F., Foradini, F., Bluyssen, P., Cox, C., & Aizlewood, C., 2006, '*Multicriteria analysis of health, comfort and energy efficiency in buildings*', Building Research and Information, vol. 34, no. 5, pp. 475-482.

Sherry, C. & Easthope, H. 2016, *'Under-supply of schooling in the gentrified and regenerated inner city*', Cities, vol. 56, pp. 16-23.

Seo, J-K., 2002, '*Re-urbanisation in regenerated areas of Manchester and Glasgow. New residents and the problems of sustainability*'. Cities, vol.19, no. 2, pp. 113–121.

Seo, B. & Chiu, R.L.H. 2014, '*Social Cohesiveness of Disadvantaged Communities in Urban South Korea: The Impact of the Physical Environment*', Housing Studies, vol. 29, no. 3, pp. 407-37

Setti, Giulia. 2013. "*Beyond Public Spaces: Shared Spaces in the Contemporary City.*" Journal of Civil Engineering and Architecture, vol. 7, no.7, pp. 833–840.

Sharp, D. 2003, '*High living', Journal of Urban Health*, vol. 80, no. 4, pp. 521-2.

Sherry, C., Easthope, H., 2016, *Under-supply of schooling in the gentrified and regenerated inner city*, Cities, Vol. 56, pp. 16-23.

Shi, Y. 2017, '*Explore Childrens' Outdoor Play Spaces of Community Areas in High-Density Cities in China: Wuhan as an Example*', Procedia Engineering: Urban Transition Conference, Shanghai, September 2016, vol. 198, pp. 654-83.

Söderström, O., Empson, L.A., Codeluppi, Z., Söderström, D., Baumann, P.S. & Conus, P. 2016, '*Unpacking 'the City': An experience-based approach to the role of urban living in psychosis*', Health & Place, vol. 42, pp. 104-10.

Song, Y., & Knaap, G. J. 2004, '*Measuring the effects of mixed land uses on housing values.*' Regional Science and Urban Economics, vol. 34, no. 6, pp. 663-680.

Strath, S. I., Greenwald, M., 2007, '*Operationalizing environmental indicators for physical activity in older adults*', Journal of Aging Phys Act. Vol. 14, no. 4, pp. 14

Talen, E., 2006. '*Design for Diversity: Evaluating the Context of Socially Mixed Neighbourhoods*'. Journal of Urban Design, Vol. 11, no. 1, pp. 1-32.

Taylor, J., Davies, M., Mavrogianni, A., Shrubsole, C., Hamilton, I., Das, P., Jones, B., Oikonomou, E., & Biddulph, P., 2016, *Mapping indoor overheating and air pollution risk modification across Great Britain: A modelling study*. London, UK: UCL Institute for Environmental Design and Engineering

Thompson, C.W. 2013, '*Activity, exercise and the planning and design of outdoor spaces*', Journal of Environmental Psychology, vol. 34, pp. 79-96.

Thompson, S., Kent, J.L. & Lyons, C., 2014, '*Building partnerships for healthy environments: research, leadership and education*'. Health Promotion Journal of Australia. Vol. 25, no. 3, pp. 202-208

Thompson, S. & Paine, G. 2017, '*What's equity got to do with health in a higher-density city?*', The Conversation, Aug 24 2017.

Turner, R. & Wigfield, A. 2017, '*Its time to recognise how harmful high-rise living can be for residents*', The Conversation, 8 December 2017.

Udell T, Daley M, Johnson B, Tolley, R. 2014, *Does density matter? The role of density in creating walkable neighbourhoods*. Melbourne: National Heart Foundation of Australia.

Vandentorren, S., Bretin, P., Zeghnoun, A., Mandereau-Bruno, L., Croisier, A., Cochet, C., Riberon, J., Siberan, I., Declercq, B., & Ledrans, M., 2016, *'August 2003 Heat Wave in France: Risk Factors for Death of Elderly People Living at Home*', European Journal of Public Health, vol. 16, no. 6, pp. 583-591.

van Kamp, I., Leidelmeijer, K., Marsman, G., & de Hollander, A. 2003, '*Urban environmental quality and human wellbeing*'. Landscape and Urban Planning, vol. 65, pp. 5–18.

Vassos, E., Pedersen, C.B., Murray, R.M., Collier, D.A. & Lewis, C.M. 2012, '*Meta-Analysis of the Association of Urbanicity With Schizophrenia*', Schizophrenia Bulletin, vol. 38, no. 6, pp. 1118-23.

Villanueva, K., Badland, H., Kvalsvig, A., O'Connor, M., Christian, H., Woolcock, G., Goldfeld, S. 2016, '*Can the Neighborhood Built Environment Make a Difference in Children's Development? Building the Research Agenda to Create Evidence for Place-Based Children's Policy*'. Academic Pediatrics, Vol. 16, no. 1, pp. 10-19.

Wener, R., & Carmalt, H. 2006. '*Environmental psychology and sustainability in high-rise structures*'. Technology in Society, vol. 28, no.1-2, 157-167.

Wilson, E., Nicol, F., Nanayakkara, L., & Ueberjahn-Tritta, A., 2008, '*Public urban open space and human thermal comfort: The implications of alternative climate change and socio-economic scenarios*', Journal of Environmental Policy and Planning, vol. 10, no. 1. Pp. 31-45.

Yan, A. F., Voorhees, C. C., 2010, *''Do you see what I see?' - Correlates of multidimensional measures of neighbourhood types and perceived physical activity-related neighborhood barriers and facilitators for urban youth*', Preventative Medicine: An International Journal Devoted to Practice and Theory, vol. 50, supplementary issue, S18-S23.

Yang, Y. 2008, *'A tale of two cities: physical form and neighborhood satisfaction in metropolitan Portland and Charlotte*'. Journal of the American Planning Association, Vol. 74, pp. 307–323.

Yung, E. H. K., Ho, W. K. O., Chan, E. H. W., 2017, '*Elderly satisfaction with planning and design of public parks in higher density old districts: An ordered logit model*', Landscape and Urban Planning, vol. 165, pp. 39-53

Zhang, J., Heng, C.K., Malone-Lee, L.C., Hii, D.J.C., Janssen, P., Leung, K.S. & Tan, B.K. 2012, '*Evaluating environmental implications of density: A comparative case study on the relationship between density, urban block typology and sky exposure*', Automation in Construction, vol. 22, pp. 90-101

Zhang, W. and Lawson, G., 2009. *Meeting and greeting: Activities in public outdoor spaces outside high-density urban residential communities*. Urban Design International, vol. 14, no. 4, pp. 207-214

Planetary Health (Total: 20 out of 141)

Barthel, S., Folke, C. & Colding, J. 2010, '*Social–ecological memory in urban gardens—Retaining the capacity for management of ecosystem services*', Global Environmental Change, vol. 20, no. 2, pp. 255-65.

Bellamy, C.C., van der Jagt, A.P.N., Barbour, S. & Smith, M. 2017, *'A Spatial Framework for Targeting Urban Planning for Pollinators and People with Local Stakeholders: A Route to Healthy, Blossoming Communities?'*, Environmental Research, vol. 158, pp. 255-68

Davern, M., Farrar, A., Kendal, D. & Gunn, L. 2017, '*Higher-Density Cities Need Greening to Stay Healthy and Liveable*', The Conversation, May 5 2017

Emmanuel, R., & Steemers, K., 2018, '*Connecting the realms of urban form, density and microclimate*', Building Research and Information, vol. 46, no. 8, pp.804-808.

Giridharan, R., Genesan, S., & Lau, S. S. Y., 2004, '*Daytime urban heat island effect in high-rise and high-density residential environments in Hong Kong*', Energy and Buildings, vol. 36, pp. 525-234.

Holmes, S. H., Phillips, T., & Wilson, A., 2016, '*Overheating and passive habitability: indoor health and heat indices,'* Building Research and Information, vol. 44, no. 1, pp. 1-19.

Jowell, A., Zhou, B. & Barry, M., '*The impact of megacities on health: preparing for a resilient future*', The Lancet Planetary Health, vol. 1, no. 5, pp. e176-e8

Kleerekoper, L., van Esch, M., & Salcedo, T. B., 2012, '*How to make a city climate-proof, addressing the urban heat island effect*', Resources, Conservation and Recycling, vol. 64, pp. 30-38.

Lee, J. M., & Braham, W. W., 2017, '*Building emergy analysis of Manhattan: Density parameters for high-density and high-rise developments*', Ecological Modelling, vol. 363, pp. 157-171.

Lee, R. X., Jusuf, S. K., & Wong, N. H., 2015, '*The study of height variation on outdoor ventilation for Singapore's high-rise residential housing estates*', International Journal of Low-Carbon Technologies, vol. 10, pp. 15-33.

Lotfabadi, P. 2014, '*High-rise buildings and environmental factors*', Renewable & Sustainable Energy Reviews, vol. 38, pp. 285-95.

Mirzaei, P. A., 2015, '*Recent challenges in modelling of urban heat island*', Sustainable Cities and Society, vol. 19, pp. 200-206.

Ng, E., Chen, L., Want, Y., & Yuan, C., 2012, *'A study on the cooling effects of greening in a high-density city: An experience from Hong Kong*', Building and Environment, vol. 47, pp. 256-271.

Pattanayak SK, Haines A. 2017, '*Implementation of policies to protect planetary health*'. The Lancet Planetary Health. Vol. 1, no. 7: e255-e

Perini, K., Magliocco, A., 2014, '*Effects of vegetation, urban density, building height, and atmospheric conditions on local temperatures and thermal comfort*', Urban Forestry and Urban Greening, vol. 13, pp. 495-506.

Ren, C., Lau, K.L., Yiu, K.P. & Ng, E. 2013, '*The application of urban climatic mapping to the urban planning of high-density cities: The case of Kaohsiung, Taiwan*', Cities, vol. 31, pp. 1-16.

Shi, Y., Xie, X., Fung, J.C.-H. & Ng, E. 2018, '*Identifying critical building morphological design factors of street-level air pollution dispersion in high-density built environment using mobile monitoring*', Building and Environment, vol. 128, pp. 248-59

Speak, A.F., Rothwell, J.J., Lindley, S.J. & Smith, C.L. 2012, '*Urban particulate pollution reduction by four species of green roof vegetation in a UK city*', Atmospheric Environment, vol. 61, pp. 283-93.

Tan, Z., Lau, K. K-L., & Ng, E., 2016, '*Urban tree design approaches for mitigating daytime urban heat island effects in a high-density urban environment*', Energy and Buildings, vol. 114, pp. 265-274.

Watts N, Adger WN, Agnolucci P, Blackstock J, Byass P, Cai W. 2015, '*Health and climate change: policy responses to protect public health.*' The Lancet. Vol. 386 (10006), pp. 1861-1914

Secondary sources: For reference only; not included within the actual sample

Bryman, A. 2012, *Social Research Methods, Oxford University Press*, United Kingdom

Barton, H., 2015, '*Planning for Health and Well-Being: The time for Action*', in Barton, H., Thompson, S., Burgess, S. and Grant, M., (Eds.) *The Routledge Handbook of Planning for Health and Well-Being: Shaping a sustainable and healthy future*, Taylor and Francis, E-Book, Accessed 27/03/2018

Healey, P., 2013, '*Circuits of knowledge and techniques: the translational flow of planning ideas and practice*', International Journal of Urban Regional Research, vol. 37, no. 5. pp. 1510-26.

Healey, P., 2011, '*The universal and the contingent: Some reflections on the transnational flow of planning ideas and practice*', Planning Theory, vol. 11, no. 2. pp. 188-207

McMichael AJ, Neira M, Bertollini R, Campbell-Lendrum D, Hales S., 2009, '*Climate change: a time of need and opportunity for the health sector*'. The Lancet. Vol.9707, pp. 2123-5.

Snilstveit, B., Oliver, S. & Vojtkova, M. 2012, '*Narrative approaches to systematic review and synthesis of evidence for international development policy and practice*', Journal of Development Effectiveness, vol. 4, no. 3, pp. 409-29

Weaver, N. Williams, J.L. Weightman, A.L. Kitcher, H.N, Temple, JMF, Jones, P and Palmer, S (2002) *Taking STOX: developing a cross disciplinary methodology for systematic reviews of research on the built environment and the health of the public*, Journal of Epidemiology and Community Health, 56: 48-55

Contact details

Landcom

Phone (02) 9841 8600

Mail Level 14, 60 Station Street
Parramatta NSW 2150

LANDCOM

Creating more affordable
and sustainable communities

landcom.com.au