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bev james
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Improving Housing Accessibility to Meet the Needs of an Ageing Population: A Rapid Review of Literature

FINAL REPORT

Prepared for the Ageing Well National Science Challenge

July 2024

Dr. Bev James, Nina Saville-Smith and Ruth Fraser

Acknowledgements

We appreciate the research funding from the Ageing Well National Science Challenge that enabled us to undertake this rapid review.

We would like to thank the peer reviewers for their generous insights and informative feedback: Dr. Jane Bringolf, Centre for Universal Design, Australia; and Joanne Donovan and Te Irirakau Tawa, Toi Ohomai Institute of Technology.

Every effort has been made to ensure the soundness and accuracy of the opinions and information expressed in this report. While we consider statements in the report are correct, no liability is accepted for any incorrect statement or information.

Author Contact Details

Dr Bev James
Principal
Public Policy & Research
bev@bevjames.nz

Citation

James, B., Saville-Smith, N., and Fraser, R. (2024) *Improving Housing Accessibility to Meet the Needs of an Ageing Population: A Rapid Review of Literature*, Report for the Ageing Well National Science Challenge. University of Otago, Dunedin.

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Glossary

Acceptable solutions Building solutions specifying construction methods that comply with the Building Code. These must be accepted by a building consent authority. See Acceptable Solutions and Verification Methods | Building Performance

Accessibility Definitions of housing accessibility vary. There are a set of related terms including 'accessible' 'visitable', 'adaptable', 'livable', 'lifetime', 'inclusive' and 'universal' housing. These include key elements of: ease of entrance and exit, ease of movement in the dwelling, and ability to make future adaptations as personal needs change (Wiesel, 2020). This review includes research using all those terms.

Future-proofing Design, construction methods and materials are used to enable future changes in the dwelling to be made to increase accessibility in an easy and cost-effective way, e.g., through reinforcing in bathroom/toilet walls for later installation of grabrails, slip-resistant flooring or adding storage space that can be used later for installation of a lift in a two-storey home.

Older people Definitions of what constitutes the older population differ from country to country and are not always stated in the studies identified in this review. While the older population in New Zealand is generally defined as aged 65 and over, increasingly, Australian researchers define 'older' as age 55 and over for non-indigenous Australians and 45 years and older for Indigenous Australians (Tually et al., 2022).

Post occupancy evaluation (POE) POE is the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time. Advancing the design of future housing is generally the impetus for POE, with clients, designers, builders, facilities managers, and other built environment professionals benefiting from the knowledge gained in the evaluation process (Wilkinson et al., 2018).

Universal Design Products and environments are designed to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design (Bowley and Sinclair, 2018).

Visitable housing This type of housing incorporates four basic accessibility features for residents and visitors. Basic features include: a one level, no-step entrance; wider doorways and hallways; wheelchair accessible bathroom on the main level; and an accessible path from outside to the dwelling's accessible entrance (Bowley and Sinclair, 2018).

Executive Summary

The accessibility of Aotearoa New Zealand's (NZ) mainstream housing stock is critically important, since that stock is poorly prepared to meet the challenges of an ageing population and growing prevalence of disability. Accessibility is an essential component in the provision of adequate housing. It is essential to wellbeing, as well as a key determinant of whether health and social services, care and support can be provided in the home.

In NZ the vast majority of new stock is built, and will continue to be built, in and for the private sector. That is why improving accessibility in mainstream housing, rather than a targeted approach through ad hoc home modifications or the construction of 'specialised' disabled housing is essential to meeting the housing needs of our ageing population.

This rapid review of literature examines the current body of knowledge about interventions used in comparable jurisdictions to increase housing accessibility in the mainstream stock. The review focuses on accessibility in new-build stock and as such is designed to address key research and policy gaps. Information from this review is intended to add to the knowledge base about the impact of housing functionality on successful ageing in place. It will also contribute to policy and planning decision-making about the accessibility and functionality of NZ's housing stock, including the potential for applying overseas interventions to improve housing accessibility.

The rapid review initially identified 159 studies for further examination. Of those, 52 core references were selected for close reading and analysis, based on their relevance to the review questions and selection criteria. The core references were reviewed to identify:

- The interventions used internationally to increase and improve accessibility in the new-build housing stock.
- The most effective approaches for increasing and improving housing accessibility.
- Tools used to assess accessibility outcomes.
- Enablers and barriers in the production of housing accessibility.

Interventions

Internationally there are a variety of approaches, tools and activities aimed at increasing housing accessibility in new-build mainstream housing. These include both supply-side and demand-side interventions, encompassing mandatory requirements and voluntary approaches.

The most common interventions identified in the literature reviewed are legislation, regulation and policy interventions. Various countries have regulations requiring accessibility in new-build housing. Those include the United Kingdom, Ireland, Denmark, France, the Netherlands, Norway, Sweden, Japan, the United States of America, and since 2022, Australia. Mandatory requirements are diverse across jurisdictions, spanning a range of accessibility standards and varying in coverage of housing types and tenures.

There are numerous examples of national or area-specific policy statements, strategies and plans setting out housing accessibility goals, including in the United Kingdom, Ireland, Norway, Australia and Canada. The provision of accessible design guidance and information to the building and construction industry is also widespread.

Other interventions described in the literature are: accreditation; funding and financial incentives; planning rules and incentives; professional development, education and training; and public promotion of accessible design.

Interventions targeted to specific populations

The rapid review considered whether any interventions specifically address the accessibility needs of older people. It also explored whether there are any tenure differences in the application of interventions.

The review revealed a scarcity of accessibility interventions specifically supporting older people's needs. Most interventions are focused on the disabled population, or the general population including older people. The few accessibility interventions targeted to the older population are associated with social or affordable rental housing for seniors.

Tenure differences in interventions are apparent. Accessibility requirements are more prevalent for public rental housing compared to private rental stock and owner-occupied housing. Often stand-alone single-family housing is exempted from accessibility regulations. Some examples of private housing built with accessible design were found. These are achieved through a mix of regulation, planning rules and financial incentives.

Few of the reviewed references highlighted the accessibility needs and design of housing for ethnic and indigenous communities. Those references note the poor alignment of accessibility interventions with the values, housing needs and health and social services needs of ethnic and indigenous communities, particularly support for family caregivers.

Accessibility assessment tools

There is little research available on accessibility assessment tools. Most of that research concerns tools that assess the efficacy of modifications in existing housing stock, rather than assessment of new-builds. There are very few post occupancy evaluation (POE) studies of accessible new-builds although it appears that POE and building performance assessments are increasingly used in evaluation of universal design. Most assessment tools focus on physical accessibility; very few are targeted to cognitive or sensory needs.

There is little focus on user perspectives and experience in dwelling assessments, making it difficult to assess whether occupants' accessibility needs are met. Moreover, there are few tools available that enable consumers to do their own accessibility assessments of a dwelling.

Effectiveness of interventions

There are significant continuities in the reviewed literature, which over time and in different countries consistently concludes that a legislative and regulatory framework is fundamental to achieving an accessible housing stock. Although voluntary, demand-side responses are often advocated, these are not effective in environments where demand cannot be realised due to factors such as industry resistance and lack of capability. Without clear directions and directives, the likelihood of generating sufficient impetus to grow the numbers of accessible stock and improve dwelling functionality is low.

There is broad agreement across the literature reviewed that multiple responses, both mandatory and voluntary, are needed to increase the number and quality of accessible new-build stock. Both supply-side and demand-side interventions are needed.

Mandatory approaches such as legislation, building regulations and planning rules are necessary but insufficient for increasing housing accessibility. The persistent undersupply of accessible stock to meet current needs, let alone future needs, is common across different jurisdictions, including those with regulatory requirements. Studies note that the potential impacts and benefits of mandatory approaches are held back by lack of industry capability, shortcomings in guidance and specifications, a focus on minimum accessibility requirements in regulations, and a lack of monitoring and enforcement of accessibility. That is why some countries implement a suite of complementary, coordinated interventions that reinforce efforts across sectors.

There is evidence across the reviewed literature that reliance on retrofitted modifications has not been effective in increasing stock numbers. Reliance on other voluntary responses, as Australia shows, has delivered numbers of accessible new-builds far below expectations. This is despite a range of initiatives including a comprehensive national strategy endorsed by both industry and government, provision of extensive technical guidance, advocacy, and educational programmes. Australia has recently added regulation to its range of interventions. In 2022 a minimum access standard for housing was incorporated into the National Construction Code.

There are few evaluations of the effectiveness of interventions available. However, there are indications of effectiveness in several studies that report data on increases in accessible stock. There is also some evidence of improvements in dwelling functionality, resident wellbeing and satisfaction due to accessible design in new-build stock.

Two Canadian case studies of new-build rental and owner-occupied developments provide information about increases in accessible stock numbers where there are mandatory accessibility requirements related to funding from public agencies and provincial accessibility regulations. Data on the impacts of planning rules on the numbers of accessible stock is provided by Canadian, UK and USA research. There is some evidence of an increase in accessible stock in Australia achieved through disability funding for housing construction. Evidence of improved living environments and improved wellbeing due to accessible design is provided by studies from Canada, Australia, Northern Ireland and NZ.

Enablers and barriers

Content analysis of the literature identified 20 enablers and 30 barriers. These are consistently identified across different jurisdictions and over time. Both enablers and barriers are found in key domains of legislation and regulation, central and local government, industry, and consumers.

The most common enabler cited in the literature is legislation and regulation setting out mandatory accessibility standards for new-builds. Other major enablers identified are: professional development and training; funding and financial incentives; and public promotion campaigns.

The most frequently cited barrier is a lack of legislation and regulation. Other barriers identified include information, industry, financial, and planning barriers.

There is evidence of support for mandatory housing accessibility requirements across sectors and stakeholders, including industry. Mandatory requirements are seen by the industry to minimise risk and increase certainty. The literature identified problems not only with an absence of accessibility legislation or regulation, but also with inadequate legislation covering only minimum accessibility requirements, or gaps in coverage of all tenures and housing types. Associated with legislative shortcomings is a lack of policy direction and leadership that sets out accessibility principles and standards in policy.

Professional development and training in the building and construction industry was identified as a major enabler. This is regarded as essential for increasing practitioner experience, knowledge and skills to deliver housing accessibility to consistently meet standards.

Associated with professional development, is the need for coherent technical information and guidance. It is not a dearth of information, but instead a plethora of contradictory guidelines, lack of clear and consistent design specifications, standards and acceptable solutions that are identified as a brake on uptake on accessible design, and a key factor impeding industry capability.

Other barriers were identified in the building and construction industry, including a general industry resistance to accessible design and inertia in building practices. The literature also noted low awareness of the benefits of housing accessibility, and stigma and negative attitudes within both the industry and the public. On the other hand, the promotion of accessible design is seen as a key lever for creating long-term, community-wide change and normalizing accessible design within mainstream housing.

There is evidence that funding and financial incentives for construction enable housing accessibility through provision of financial resources and sustainable funding streams. Funding can be provided through procurement practices of government agencies that require publicly-funded housing to include accessibility. Conversely, lack of access to funding, as well as lack of financial incentives are identified as fundamental inhibitors of industry take-up of accessible design. Some studies also commented on financial constraints on householders, which affect their use of accessible design in new-builds and renovations.

Planning and consenting impediments were reported. Those included: conflicting requirements for level entry; rules constraining the development of smaller, higher density housing and innovative housing; delays in consents; scant knowledge of housing accessibility within planning and consent authorities; and lack of monitoring and enforcement of accessibility requirements.

Application to NZ

There are policy and practice implications from the rapid review for NZ, although it is important when considering overseas models to take account of this country's specific institutional, market, social and cultural characteristics.

The reviewed literature's analysis of enablers and barriers provides information about how and where to focus efforts to increase housing accessibility. Similarly, there are examples of effective interventions that could inform a NZ approach. There is also information about the development and use of accessibility assessment tools that would strengthen existing dwelling assessment tools used in NZ.

The literature is clear that the most effective responses are mandatory requirements, including legislation, regulation and planning requirements. Reliance on voluntary approaches for new-builds and home modifications in existing dwellings have had no appreciable effect on increasing housing accessibility.

Although regulation is effective, mandatory requirements alone are insufficient for increasing accessibility in the housing stock. Multiple responses are needed to increase the number and quality of accessible new-build stock. Financial support through funding (including capital funding), financial incentives and government procurement, have all increased numbers of accessible stock. There is also evidence of the positive impact of planning requirements and enablers in increasing housing accessibility. The provision of accreditation, detailed design guidance and trades training, specifications, easy-to-use products and acceptable solutions all support the construction of accessible stock.

The Australian experience of moving from voluntary interventions to regulation provides useful insights for NZ. Those include: the limited impacts of voluntary responses; policy, legislative and regulatory frameworks that provide certainty and a 'level playing field'; the key role of accessibility advocates and champions across sectors; the critical importance of political support and leadership; and the necessity for robust, comprehensive design guidance to support implementation of accessible design.

The literature provides limited policy and practice insights concerning accessible housing interventions for Māori, Pasifika and other ethnic communities in NZ, although there are a few references commenting on the application of interventions in indigenous and cultural contexts. Those references noted that the lack of attention to cultural perspectives reduces choice and control over housing, and consequently impacts on seniors' ability to age in place. The growing diversity and ageing trajectories of NZ's population underscores the importance of culturally-informed approaches to increase housing accessibility.

This review has identified further research and research-based tools that would support efforts to increase and improve accessibility in new-build housing stock. Those are:

- Research, development and demonstration of practical, cost-effective approaches to accessibility, across different housing typologies.
- Development of acceptable solutions. In NZ, acceptable solutions for level entry has been identified as a significant knowledge gap.
- Development of comprehensive and consistent accessibility assessment tools that can be used for major renovations and new-builds.
- Better informed, nuanced understanding of competing priorities and incentives of different stakeholders, and their impacts on achieving housing accessibility.
- Best-practice in engaging diverse groups of users in accessible design and assessments.
- How to include diverse accessibility needs into standards (physical, sensory, cognitive).
- Improving the evidence base on both the demand for and supply of mainstream housing built with accessible design.
- Improving data and research on housing accessibility related to tenure.
- Development of accessible design guides embedded in cultural perspectives and practices.

1. Introduction

This rapid review of research literature about housing accessibility focuses on interventions aimed at increasing the numbers of accessible, new-build housing in the mainstream stock, and improving dwelling functionality and performance so that stock serves people over their lifetime. The review examines the current body of knowledge about interventions used in comparable jurisdictions to increase housing accessibility in the mainstream stock. It also considers the potential for applying those interventions to improve housing accessibility in Aotearoa New Zealand (NZ).

Accessibility is becoming increasingly important to address in NZ, since our housing stock is poorly prepared to meet the challenges of an ageing population and increasing prevalence of disability.[1] Only an estimated 2% of NZ's dwellings are accessible, while one in six people need modifications to live safely in their homes (Farha, 2021). Those challenges have been recognised in strategic policy documents on housing and the ageing population, including Te Tūāpapa Kura Kāinga/Ministry of Housing and Urban Development (2023) *Long-term Insights Briefing on the Long-term Implications of our Ageing Population for our Housing and Urban Futures (LTIB)*, and the Office for Seniors *Better Later Life – He Oranga Kaumātua*.[2]

This rapid review is designed to contribute to policy and planning decision-making concerned with the accessibility and functionality of NZ's housing stock. It adds to the knowledge base about the impact of housing functionality on successful ageing in place. Its emphasis on new-builds and the mainstream housing market addresses a key research gap, since both policy and research have been predominantly concerned with the impacts of home modifications in existing stock (Lindsay et al., 2024; MacLachlan et al., 2018; Ward and Bringolf, 2022; Wiesel, 2020).

Accessibility is an essential component of adequate housing and as such, a key determinant of health and wellbeing. Accessibility, or lack thereof, can enable or disable older people (Heller et al., 2022; MacLachlan et al., 2018; Plouin et al., 2021). There are significant health, safety and wellbeing benefits for seniors from improving the accessibility of housing stock, as well as societal savings in institutional care and home-based support services (Plouin et al., 2021; Sinclair et al., 2020; Štaube et al., 2016; Tually et al., 2022; Wiesel, 2020). Poor accessibility impacts on seniors' safety, undermines their independence and quality of life, increases their care needs and is implicated in premature admission to residential care (Jonsson et al., 2021).

Accessible and affordable housing is at the fulcrum of many issues, affecting older people's ability to participate in their communities and access the services they need (Tucker et al., 2022). The home is increasingly important as the site where health, care and support services are delivered. Consequently, accessibility impacts on the efficiency of the delivery of care and other home-based services for seniors (James, 2019; Sinclair et al., 2020; Štaube et al., 2016; Wiesel and Habibis, 2015).

[1] See The disability gap 2018 | Stats NZ

[2] See Long-term Insights Briefing - Te Tūāpapa Kura Kāinga - Ministry of Housing and Urban Development (hud.govt.nz) ; Better Later Life – He Oranga Kaumātua 2019 to 2034 | Te Tari Kaumātua (officeforseniors.govt.nz)

Despite international recognition of the societal benefits of housing accessibility, NZ's building legislation and Building Code have no requirements for accessible standards in residential housing. By contrast, various European countries, Japan, the United Kingdom (UK), the United States of America (USA) and some Australian states have mandatory residential building standards for accessibility.

This report is structured as follows:

- Section 2 sets out the research approach and method.
- Section 3 discusses the range of interventions used to increase accessibility in mainstream housing stock.
- Section 4 presents evidence on the effectiveness of different interventions.
- Section 5 summarises the enablers and barriers influencing the construction of accessible new-builds.
- Section 6 considered the application of the rapid review findings to NZ.
- Section 7 makes some concluding comments and indicates areas for further research.

2. Rapid review method and application

The rapid review is a simplified version of the systematic literature review method, used where evidence-based information is required in a short timeframe. The rapid review synthesises key themes and findings in the literature and reports them in narrative form.[3] Some references identified for this rapid review were helpful in guiding our approach (MacLachlan et al., 2018; Mosca and Capolongo, 2018; Schaff et al., 2022; Wilkinson et al., 2018).

The rapid review approach allows examination of diverse and somewhat fragmented evidence spread across different disciplines, research domains, research methodologies, and institutional sectors. It is therefore a suitable method for this study, as a coherent body of relevant research does not exist. We found a diversity of sources, different methods of data collection and analysis and varying detail of reporting findings. Consequently, aggregation of findings has not been possible. Instead, we have used a qualitative approach to analyse and synthesise the literature, through the development of descriptive and analytic categories and themes. In this respect, the review has used elements of the thematic review and scoping review approaches to map the range, content and coverage of the relevant literature.

The objective of this rapid review is to examine the current body of knowledge to identify the tools and interventions used in comparable jurisdictions to increase and improve accessibility in new-build housing stock. The review includes analysis of the effectiveness of different interventions (in improving and/or increasing accessibility), alongside analysis of the pre-conditions required for achieving greater numbers of accessible stock. The review identifies literature that contributes to understanding how to improve the implementation and efficacy of accessible design.

[3] See Ganann, R., Ciliska, D., & Thomas, H. (2010) Expediting systematic reviews: methods and implications of rapid reviews *Implementation Science* 5:56.

The following questions have guided the review:

- What are the interventions used internationally to increase and improve accessibility in the housing stock?
- What are the most effective approaches to increasing and improving accessibility in the housing stock?
- What tools have been developed/used to assess accessibility outcomes?
- What are the constraints and opportunities for improving accessibility in the housing stock across owner-occupation and rental tenures?
- Are any interventions specifically directed to seniors that address their accessibility needs, (physical, sensory and cognitive), including approaches that take account of carers' needs?
- What are the lessons from international interventions that NZ can learn and apply to improve the accessibility of housing stock?

Preliminary findings from the rapid review were tested in a workshop of stakeholders with research, policy and practice expertise in housing accessibility (see Appendix D for a description of the workshop). Eleven people attended the workshop. Their areas of expertise include housing and building policy, housing research and statistics, architecture and universal design, accessibility standards and accreditation, and housing provision. Using a workshop format involving knowledgeable participants who directly engage with information is a way of strengthening the rapid review as it contributes to analysis of findings. As a forum in which to present early findings from the review, the workshop has an impact through informing participants of issues and perspectives that they may carry into their work.[4] Insights from the workshop are presented in later sections.

2.1 Review scope

The primary focus of this review is on housing accessibility in the mainstream stock. The terms accessibility and accessible design are prevalent in the literature, although a variety of related terms are used, including universal, inclusive, liveable, adaptable, age-friendly and lifetime homes (Bowley and Sinclair, 2018; Brausch and Katunský, 2015; Štaube et al., 2016; Tucker et al., 2022). There are diverse and overlapping definitions and uses of these terms, as well as debates and challenges around how those terms are perceived. Some terms are considered to carry stigma (Bringolf, 2011). Moreover, there are prevailing social attitudes that accessibility is about physical limitations rather than a right for all (Jonssen et al., 2021). Larkin et al., (2015) posit that the lack of commonly agreed terminology acts as a barrier to designing homes for the broadest range of people. While acknowledging those debates, a detailed investigation and analysis of definitions is beyond the scope of this rapid review. Our approach aligns with Wiesel's (2020) broad definition of accessibility, which includes the key elements of ease of entrance and exit, ease of movement in the dwelling, and ability to make future adaptations as personal needs change.

This review does not focus on research about home modifications or adaptations to existing stock, although internationally modifications have been a dominant response to increasing housing accessibility (Ward and Bringolf, 2022; Wiesel, 2020; Wilkinson et al., 2018). Home

[4] See the following for commentary on using research to inform policy development: Fotheringham, M., Gorter, T., & Badenhorst, A. (2021) Enhancing impact: a model for policy development research, *Policy Design and Practice*, 4(3): 372-391, DOI: 10.1080/25741292.2021.1961377

modifications literature provides complementary information for this review and is referenced where relevant. Similarly, this review does not include research on legal protections for people with disabilities, as much of that research is not centrally concerned with housing accessibility. Nor does this review include research on age-friendly environments and cities, unless it focuses on the role of accessible housing in creating age friendly environments (e.g., Sinclair et al., 2020).

Finally, this review has only examined the literature identified through the targeted search process. It has not undertaken independent verification of information about interventions discussed in the literature reviewed. Nor have we searched for recent changes in legislation, policy or other interventions. That would have required additional and extensive country-by-country investigation of interventions, which is outside of this review's terms of reference.

2.2 Rapid review steps

Before conducting the rapid review, a 'baseline review' was done. The purpose of the baseline review was to collate existing knowledge and evidence on housing accessibility interventions contained in previous NZ studies.

Six NZ reports spanning 2007-2022 and covering a wide range of NZ and international literature relating to housing and/or accessibility were selected for the review. Each report was read closely and information was extracted on:

- Existing knowledge about housing accessibility.
- Interventions to increase and improve accessibility in the new-build stock.
- Evidence about whether interventions have improved accessibility outcomes.
- Barriers and enablers for achieving accessibility.
- Key references relevant to the current rapid review.

The baseline review identified key themes and also useful references for the rapid review. Findings from the baseline review are presented in Appendix C, and insights reported in sections 4 and 5 below.

Subsequently, the rapid review process consisted of three steps. Firstly, a systematic search of known databases and websites was conducted to identify potentially relevant literature. Secondly, the collected references were screened for relevance. At this point references that did not meet relevance criteria were excluded. The third step consisted of close and detailed reading of key references and extraction of information into a database for analysis.

Step 1 was a systematic search for NZ and international research using key search terms as follows:

- Accessibility, universal design, lifetime design, inclusive design
- Interventions: legislation and regulation, policy and strategy, programmes, financial incentives, planning rules and incentives, accreditation, information, guidelines
- Housing, residential buildings, private housing
- New builds
- Evaluation, assessment, monitoring of interventions
- Accessibility assessment tools

Searches were conducted in English. The search timeframe was limited to literature published from 2014-2024, to minimise overlap with the reports considered in the baseline

review. A few references prior to 2014 were included due to their significance in advancing knowledge about housing accessibility. Typically, those references contained a comprehensive summary of issues, challenges and enablers, and/or have continuing relevance to this area of study.

Countries commonly included in comparative literature reviews were focused on, i.e., North America, United Kingdom, Australia, Europe (NZIER, 2017; Stewart, 2021). A few other countries with examples of legislative, policy or other incentives to increase housing accessibility were identified as the review progressed, notably Japan (Plouin et al., 2021; Ward, 2013).

Articles were selected by analysing title, key words, and abstract. In some cases a keyword search of the article was done if it was unclear whether the article was relevant. References were excluded if they were concerned with:

- Accessibility in public buildings, not residential stock
- Aged residential care, hospitals
- Home modifications in existing stock
- Policy, strategy, legislation, standards, programme manuals and documents that do not include research.

The search included both published academic research and grey literature such as policy/programme evaluation reports and strategic and policy documents. Search engines such as Google and Google scholar were used, as well as targeted searches of research, university and other organisations known to conduct accessibility research. This included searches for known researchers publishing in the area. Key organisation websites searched were: the AHURI (Australian Housing and Urban Research Institute), BRANZ (Building Research Association of New Zealand), BRE Group, Building Better Homes Towns and Cities National Science Challenge, Canada Mortgage and Housing Corporation, Centre for Excellence in Universal Design Ireland, Centre for Universal Design Australia, Home Modifications Information Clearinghouse Australia, InclusionaryHousing.org, Inclusive Design Hub, Institute for Human Centred Design, Joseph Rowntree Foundation, Livable Housing Australia, NZ Disability Support Network, Office for Disability Issues (NZ), Office for Seniors (NZ), The American Institute of Architects.

Three researchers conducted literature searches. Decisions made about a small number of references were compared to ensure consistency in searching and categorisation. Step 1 identified 159 studies for further review.

In **Step 2** the 159 references were read and further screened for relevance, according to the search criteria. At this point, references needed to be mainly concerned with housing accessibility in private residential dwellings (not institutional accommodation or public buildings), focused on new-builds, and provide some analysis of one or more intervention, in order to be considered. If there was any problem in deciding whether a reference was relevant, the three researchers conferred and a joint decision was made.

Sixty-three references were excluded for various reasons listed in Table 1. Some references were excluded for multiple reasons, but only the main reason is reported below. The most common reason for exclusion was that the reference did not include research evidence (19 references). Such references included policy or strategy documents, guidance manuals, legislation, data reports or opinion pieces. A further 12 provided no, or insufficient research on accessibility interventions. Eleven references were concerned with home modifications in

existing stock, not on accessible design in new-builds. Nine references were concerned with aspects of ageing and health/disability with no or negligible focus on housing accessibility. Eight references focused on accessibility in non-private dwellings, notably aged residential care and hospitals.

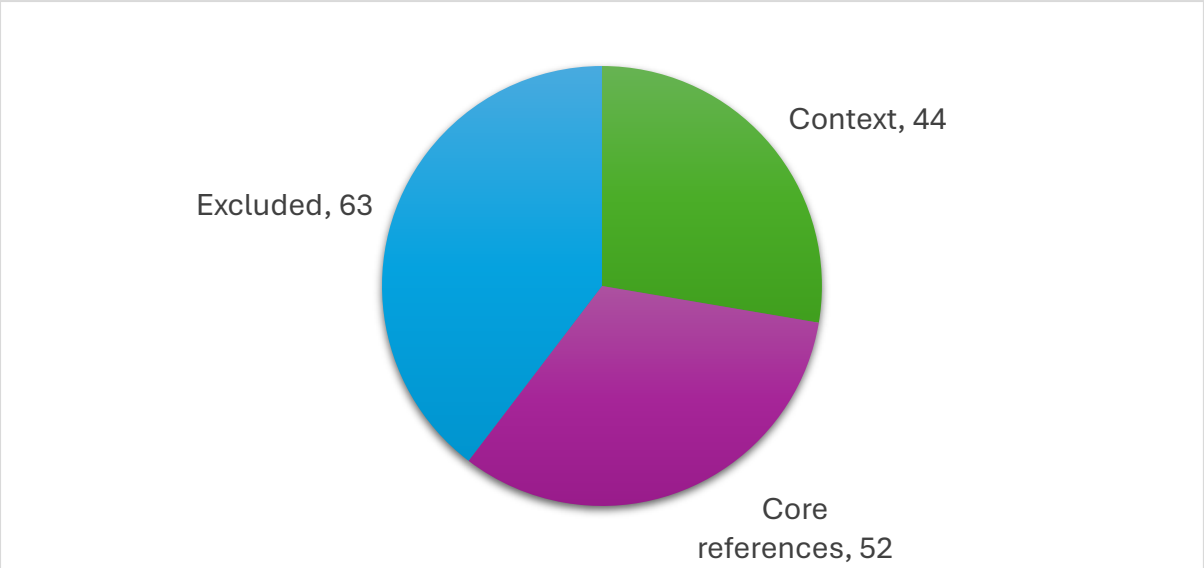
Table 1: Main reasons for excluding references

Reason for exclusion	Number
Not research	19
Insufficient research on accessibility interventions	12
Home modifications in existing stock	11
Focus on ageing, health and disability	9
Aged residential care, hospitals	8
Outside timeframe or findings included in more recent publication	3
Public buildings	1
Total	*63*

Forty-four references, although not fully meeting search criteria, were retained because they provide important contextual information. These were wide-ranging in subject matter, including the history of accessible home design, the history of the development of accessibility legislation and disability legislation, accessibility targets, involvement of not-for-profit housing providers in producing accessible housing, the relationship between ageing well and housing accessibility, ageing-in-place and home modification policies, and other responses such as accessible housing registers. Contextual literature is referred to in the review where it provides additional evidence. That literature is presented in the Context References list (Appendix B).

In all, 52 core references were selected for close reading and analysis, based on their relevance to the review questions and selection criteria. This literature is presented in the Core References list (Appendix A) and is the primary focus of the rapid review.

Figure 1: Counts of core, context and excluded references



In **Step 3** information was extracted from each of the 52 core references and summarized into a review template, recorded in excel. The review template was tested with three

references and adjustments made to ensure necessary information was extracted to address the research questions.

Descriptive data and notes were created for the following categories:

- Full publication details
- Brief overview of contents
- Summary of findings and conclusion
- Country/jurisdictions
- Discipline/s and research areas
- Methods
- Summary and types of interventions
- Information on any evaluation of intervention, and effectiveness of intervention
- Population/s covered
- Sectors and stakeholders
- Housing typology and tenure
- Barriers to achieving accessibility
- Enablers to achieving accessibility
- Engagement with end users
- Identified policy gaps
- Identified research gaps
- Research quality, limitations
- Relevance to NZ
- Additional comment (e.g., highlighting a particular finding or linking to similar research).

2.3 Country coverage

Table 2 presents the range of countries covered in the 52 core references. Around one-third of the literature reviewed focused on a single country, while the rest covered two or more jurisdictions. The systematic and literature reviews covered multiple jurisdictions.

Table 2: Country sources

Country/ies	No. of references
Australia	31
UK	11
NZ	7
Canada	6
Europe	6
USA	6
Asia	2
South America	2
OECD, EU countries or WHO regions	2

* Multiple response

The most-represented country among the references is Australia. This is due to the sustained advocacy, policy and research interest in achieving accessible design in new-build housing since the early 2000s (see Appendix E). The institutional context includes the voluntary national inter-sectoral Liveable Housing Design agreement established in 2010,

and the National Disability Insurance Scheme (NDIS), which provides funding for people with disabilities to access a range of service, including housing.

2.4 Research domains, methods and topics covered

Table 3 shows the disciplines and research domains of authors. Most references had more than one author. The largest group of references were in architecture and design, including universal design. This was followed by housing research, focusing on analysis of housing policy and interventions, or demand and supply of accessible housing. Health research areas included gerontology and occupational therapy.

Table 3: Disciplines and research domains

Discipline/research	No. of references
Architecture/design	23
Housing	18
Health	13
Disability	8
Planning	6
Economics	5
Built environment	4
Engineering	4
Sociology	4
Law	3
Landscape architecture	1
Policy	1
Social work	1

* Multiple response

A range of methods were evident in the literature. These included reviews of research literature, surveys, interviews, focus groups, workshops, case studies, financial modelling, cost-benefit analysis, content analysis, discourse analysis, data analysis using existing data sets, accessibility assessment of existing dwellings, assessment of accessible plans, document analysis, comparative analysis of legislation, policy and design guidelines, and outcomes assessment.

Of the 52 core references, only two comprised a systematic literature review.[5] They covered stakeholder priorities for inclusive accessible housing (Lakhani et al., 2019) and post-occupancy evaluation instruments (Wilkinson et al., 2018).

Seventeen core references included literature reviews as the primary research method or as a substantial component. Topics covered included:

- Affordable and adaptable housing solutions (Bowley and Sinclair, 2018).
- Accessible housing design (Liebermann, 2013).
- Universal design and housing (Denizou, 2016; Shahrom and Zainol, 2015).

[5] A systematic literature review aims to identify, analyse and synthesise findings of a body of research literature on a specific topic or research question. Commonly applied in clinical contexts, it uses robust, replicable search strategies and analyses both quality and relevance of the research. Systematic reviews often synthesise and report data using statistical methods.

- Age-friendly housing (Štaube et al., 2016).
- Accessible housing practices, policies and interventions (Lindsay et al., 2024).
- Methods and instruments to assess accessibility and inclusion of the built environment (Mosca and Capolongo, 2018).
- Design solutions for people with dementia (James, 2019; James and Saville-Smith, 2019; Pierce et al., 2015).
- Disability legislation and outcomes (Hall, 2015; NZIER, 2017).
- Assessment of lifetime homes for visually impaired (Rooney et al., 2016; Rooney et al., 2018).
- Housing accessibility assessment tools and checklists (Valderrama-Ulloa et al., 2023; Valderrama-Ulloa et al., 2024).
- Housing assistance programmes for people with a disability (Wiesel and Habibis, 2015).

3. Legislative, policy and other interventions

The literature covered in this rapid review revealed a range of approaches, tools and activities aimed at increasing housing accessibility in new-build stock. A diverse range of supply-side and demand-side interventions, including mandatory requirements and voluntary approaches to increase accessibility in mainstream housing stock, were identified.

The spread of references mapped to different types of interventions is presented in Appendix F, Table F.3. The highest number of references focus on legislation and policy interventions, which are often dealt with together in analyses, and the provision of accessible design guidance and information to the building and construction industry. Other common interventions considered in the literature are accreditation, funding and financial incentives.

Those common interventions, alongside other interventions are described in the following subsections, with examples. Broadly, the discussion moves through mandatory/obligatory and supply-side interventions to voluntary and demand-side interventions, although the distinctions between those characteristics is not always useful, since some interventions include mandatory as well as voluntary elements, or use both supply and demand levers.

3.1 Legislation and regulation

Most countries used as comparators or benchmarks for NZ, such as the UK, USA and Australia, require some level of accessibility in new-build housing. Mandatory requirements are diverse across jurisdictions, in terms of accessibility standards and coverage of housing types.

Countries with accessibility requirements for private dwellings include the UK, Ireland, Denmark, France, the Netherlands, Norway, Sweden, Japan, the USA, and since 2022, Australia (Bringolf, 2011; Denizou, 2016; Grangaard and Gotlieb, 2019; Hall, 2015; Heller et al., 2022; Lindsay et al., 2024; Lund and Bringa, 2016; Plouin et al., 2021; Rooney et al., 2016; Štaube et al., 2016; Stewart, 2021; Valderrama-Ulloa et al., 2023; Ward and Bringolf, 2022). A few countries, like Sweden and France, have accessibility requirements for both new-builds and substantial renovations (Plouin et al., 2021).

There is a tendency to require minimum access standards such as visitability, and to qualify requirements with exemptions, or require accessibility only ‘if possible’. Not all housing types are covered by regulatory requirements. In several jurisdictions, stand-alone single-family

housing is not covered; instead the requirements apply to publicly-funded or ‘multi-family’ housing such as apartments (Bowley and Sinclair, 2018; Hall, 2015; Leonard, 2022; Plouin et al., 2021; Wilkinson et al., 2018). This is despite detached, single-family dwellings generally being the largest market sector (Liebermann, 2013).

One example of minimum requirements is Canada, which has some building code requirements for barrier-free accessibility. However, many housing types are excluded from the requirement, such as detached, semi-detached, secondary suites, duplexes, triplexes, townhouses and rowhouses. Nevertheless, some provinces and municipalities require additional features beyond the code, such as visitability features and future-proofing (Bowley and Sinclair, 2018; Park, 2014).

Critics of minimum requirements argue that they can become a ‘tick box’ exercise and thus ineffective in increasing numbers of accessible stock to address undersupply, and moreover do not guarantee appropriate or functional accessibility features that meet actual needs (Bowley and Sinclair, 2018; Larkin et al., 2015; Tucker et al., 2022). Grangaard and Gotlieb (2019:369) argue that “… prescriptive requirements become an unnegotiable minimum threshold” and instead recommend performance-based regulation to encourage better accessible solutions.

The advantages of regulation are that it requires reluctant actors to engage and provides certainty and risk minimisation for builders and developers (Liebermann, 2013; Ward, 2013). However, to be successful, regulation needs to be supported by detailed technical guidance, acceptable solutions and enforcement (Denizou, 2016; Lindsay et al., 2024).

3.2 Policy and strategy

There are numerous examples of national or area-specific policy statements and strategies setting out accessibility goals, and in some instances, targets. Often, but not always, policy is actioned through legislation and regulation. Policy can also be actioned through voluntary measures such as information resources, education and training programmes or promotional campaigns.

One example of a national-level strategy is Ireland’s National Housing Strategy for Disabled People (Leonard, 2022; Plouin et al., 2021). The strategy presents a vision and strategic objectives intended to improve housing outcomes for people with disabilities. It aims to ensure increased access to accessible housing, including through mainstream housing policies. Another overarching strategy is the UK National Housing Strategy, which incorporates the Lifetime Homes standards of accessibility and adaptability (Bowley and Sinclair, 2018).

Australia has numerous examples of strategic documents. The Livable Housing Design Agreement, established in 2010, is a voluntary, industry-led strategy (Ward and Franz, 2015). The National Disability Strategy, produced by the Council of Australian Governments, features housing in two of the six key policy outcomes - inclusive and accessible communities, and economic security (Crowe et al., 2024; Galbraith, 2018; Larkin et al., 2015).

Since 2005, Norway has developed and reviewed its action plans for universal design, aiming for “a universally designed society” (Lund and Bringa, 2016). This strategic approach embeds universal design into government policies and administration, setting activities, targets and budgets. It is an example of an integrated policy, since it is inter-sectoral,

covering key areas of society, including the built environment, planning, and public agency procurement of housing. The adoption of successive plans has resulted in implementation of universal design goals in the Planning and Building Act, and associated regulations. Municipalities also incorporate universal design into their strategies.

Local plans are key drivers for increasing the numbers of accessible stock in England. In their local plans, planning authorities can require a proportion of new-builds to conform to a specified accessible standard as set out in building regulations (McGill et al., 2019).

Another example of local strategies is provided by Canada, where most provinces and some municipalities have affordable housing strategies, some of which include accessibility policies (Bowley and Sinclair, 2018). The Manitoba government adopted VisitAble[6] housing as a policy direction before its use in a major housing development at Bridgwater, Winnipeg, starting in 2003 (Park, 2014).

3.3 Funding, financial incentives and government procurement

The literature provides various examples of funding programmes and financial incentives. These can be both supply-side and demand-side interventions.

Examples of supply-side interventions include tax credits, tax incentives and building permit fee waivers provided by some state governments and local authorities in the USA for construction of universal design and visitability features in residential homes. The city of Austin, Texas provides one example, where an expedited review process and fee waivers are used to encourage the construction of affordable housing, which must meet visitability standards required by a mandatory city ordinance (Hall, 2015).

Another supply-side lever is through procurement, where central and local government agencies require accessibility standards as a condition of receiving public funding for social and affordable housing (Saville-Smith et al., 2016; Stewart, 2021; World Health Organization, 2021). Hall (2015) cites several examples. In Atlanta, builders of new single-family dwellings, duplexes, or triplexes that receive any financial benefit from or through the city must meet basic access standards. In Minnesota, new single-family homes, duplexes, triplexes, and multilevel townhouses financed though the state Housing Finance Agency must incorporate visitability.

DesignABLE Inc. (2020) presents 11 Canadian case studies of multi-use residential buildings (MURBs) that include accessible, visitable, and/or universal design features. Private sector developers and not-for-profit housing organisations received capital funding for those developments from municipal authorities, provincial governments and central government. In some instances, additional contributory funding was obtained from philanthropic trusts, health care providers, the Ministry of Seniors and the Canada Mortgage and Housing Corporation. One public-private partnership development was funded through the Canada-Manitoba Affordable Housing Programme Agreement. This development also gained a rates rebate and geothermal credits for including energy efficiency features. One development was required to ensure that 100% of the units were accessible or barrier free. Most of the 11 case studies demonstrate high levels of accessible and/or barrier free units.

[6] The VisitAble standard requires level entrance, wide doorways and clear passages on the main floor, and a wheelchair-accessible bathroom on the main floor (Park, 2014).

There are Australian examples of government procurement to construct accessible dwellings. In response to the Global Financial Crisis, the Housing NSW Stimulus Package required 50% of housing to be built to universal design (Bringolf, 2011). Another example is Specialist Disability Accommodation (SDA) funding, which is available to private developers and not-for-profit housing providers offering new-build dwellings that meet accessibility standards (Crowe et al., 2024; Sarkodee and Martel, 2018). One study found that more than half of the fully (wheelchair) accessible SDA places were developed by private developers (Aimers et al., 2021). Although this funding support is for disabled people under the age of 65, it nevertheless facilitates ageing well by ensuring suitable housing and tenure security as people with disabilities age.

Mortgage finance is an example of a demand-side lever that may be applied to ensure more accessible new-builds. In Japan and Canada, government lending institutions offer mortgage finance for housing that meets accessible standards (DesignABLE Inc., 2020; Ward, 2013). In addition, Australia provides funding through the NDIS for new-builds for disabled people (Callaway and Tregloan, 2018; Callaway et al., 2020).

The literature highlights issues with the provision of funding or financial incentives. These include poor specification of universal design/accessibility standards, funding shortfalls, complicated application procedures, and lack of retention of accessible stock for households that need it (Aimers et al., 2021; Bringolf, 2011; Crowe et al., 2024; The Centre for International Economics, 2021). Furthermore, there are calls for accessibility assessments of publicly-funded housing, to ensure compliance with relevant accessibility standards (Grant et al., 2017; McGill et al., 2019).

3.4 Planning rules and incentives

Local government planning rules and incentives are used to encourage new-build accessible housing. Examples are provided by Canada, the USA, England and Norway.

McGill et al., (2019) explains that in England, the National Planning Policy Framework (NPPF) requires Local Planning Authorities to gather evidence to support planning policy for accessible housing. Consequently, some local authorities have introduced planning rules to increase accessible stock. The report cites examples of local requirements and targets, including Daventry District Council (50% of all dwellings will be built to accessibility standards), and Leeds City Council (30% of dwellings meet the ‘accessible and adaptable dwellings’ standard and 2% of dwellings meet the requirement of wheelchair adaptable or accessible dwellings). Another example is the London Plan, which requires 90% of new homes to be accessible and adaptable with a further 10% built to meet the needs of wheelchair users (LAHR, 2011; McGill et al., 2019; World Health Organization, 2021).

In Norway, municipalities are the lead organisations for implementing universal design, through action plans and projects. These initiatives cover buildings, outdoor areas and housing (Lund and Binga, 2016).

Bowley and Sinclair (2018) report that some Canadian provinces and municipalities include accessibility requirements for new housing that extend beyond the building code. These include future proofing features and visitability elements. In some locations these requirements are mandatory for both new housing, and for major renovations.

Park (2014) provides a detailed case study of accessibility in the Bridgwater, Winnipeg Canada land use plan for both public/community facilities and residential housing. The

Manitoba Housing Renewal Corporation (a crown corporation) launched three new housing developments and an associated town centre for Bridgwater in 2006. Private housing developers were required to incorporate VisitAble (basic accessibility features) as a proportion of new housing. As part of an integrated approach to the development, the public authority prepared the land for developers through addressing infrastructure, grading and drainage. This facilitated level entry, which was a build requirement in the developments.

Hall (2015) reports that as of 2014, 34 states and 59 local jurisdictions in the USA had implemented visitability criteria or universal design standards. Hall (2015) also notes an expedited review process and fee waivers in Texas, and the town of Freehold New Jersey waives building permit fees for residential housing constructed to include universal design and visitability features. Several California counties require visitability features in new housing (Liebermann, 2013).

3.5 Accreditation

Accreditation through a standards setting body is a way of verifying and certifying that required accessibility standards are met. There are several examples of voluntary accessibility accreditation systems, including Livable Housing Australia, Livable Design (USA) and NZ's Lifemark (Crowe et al., 2024; Liebermann, 2013; Stewart, 2021; The Centre for International Economics, 2021).

An example of a mandatory accreditation system is Australia's SDA Design Standard, required for a new-build dwelling seeking enrolment under the NDIS (Aimers et al., 2021).

3.6 Professional development

Examples of professional education and training are evident in Australia (Bringolf, 2011; Crowe et al., 2024; Larkin et al., 2015; Ward and Franz, 2015), Ireland (Busby and Harrison, 2018), UK (Bringolf, 2011; Rooney et al., 2016), and the USA (Lindsay et al., 2024).

Professional development is offered by industry associations, not-for-profits, local and central government agencies as well as tertiary education institutions. The most common disciplines in which universal design or accessible design are taught appear to be architecture and occupational therapy (Busby and Harrison, 2018; Larkin et al., 2015).

In Australia, Crowe et al. (2024) note the key role of community housing providers in both providing accessible housing and offering extended, although unfunded, support and education about accessible housing. Similarly, in NZ, James (2024) found that community housing providers are among the main providers of accessible housing. That study suggests a learning community about accessible design is developing among designers, builders and housing providers, with indications that knowledge and use of accessible design is transferring from completed projects to future developments.

3.7 Accessibility assessment tools

A key question guiding this rapid review was to identify tools used to assess accessibility outcomes. Such tools provide a way to monitor compliance with accessibility standards and therefore the efficacy of standards in determining the provision of accessible housing stock. The rapid review discovered little research on accessibility assessment tools. Most of the available research focuses on tools that assess modifications to existing housing stock (Wilkinson et al., 2018).

Plouin et al., (2021) note that only a few countries conduct housing accessibility assessments, and those that are done tend to emphasise physical accessibility or barrier-free features. Comprehensive, cross-country data on other accessible design features in the housing stock (e.g., relating to sensory needs) do not exist. James and Saville-Smith (2019) found very few assessment tools with any consideration of sensory needs.

Mosca and Capolongo (2018) conducted a literature review of methods and instruments to assess the accessibility of the built environment. They found that although there is an increase in theoretical studies, this does not flow through to architectural practice or performance-based knowledge. The history of assessment research in these fields is short and consists primarily of case study evaluations of built projects or products. Various assessment methods are used, however subjective evaluations of the efficacy of accessibility features are more common than objective evaluations based on measurable criteria or standards such as used in post occupancy evaluation (POE) studies.

There are very few POE studies on new-build accessible housing, although Wilkinson et al., (2018) note that POE and building performance assessments are increasingly used in evaluation of universal design. Wilkinson et al., (2018) conducted a systematic literature review of POE tools to inform development of a rigorous framework for the POE of dwellings for disabled people, with the aim of improving design and suitability of their housing. The review identified 172 POE studies, of which 55 were selected for analysis. Ten POE instruments were chosen for in-depth analysis. The authors found that POE instruments show varying degrees of reliability, validity and internal consistency. Only one POE instrument was able to assess housing intervention cost-effectiveness.

Across all types of interventions, there is little focus on user-centred accessible design and user perspectives and experience. This is particularly evident in research on assessment tools, which tend not to include any assessment by users. Lakhani et al., (2019) comment that post-occupancy consultation with end-users is an important aspect of accessible design improvement, and a process that could enable industry learning. However, user involvement is not a routine practice in either the housing construction or design sectors. This finding is confirmed by Mosca and Capolongo (2018), who found that building users are rarely involved in evaluations, which makes it difficult to assess whether occupants' accessibility needs are met. Wilkinson et al.'s (2018) systematic review also commented that users' perspectives and experience of the home must be understood to effectively evaluate the built environment.

There are few tools available that enable consumers to do their own accessibility assessments of a dwelling. Valderrama-Ulloa et al., (2023) present a quantitative inspection tool enabling buyers or tenants to assess the accessibility of apartments. In this tool, accessibility is defined according to four pillars: Autonomy, Mobility, Comfort, and Safety. The authors report on the assessment tool's application in 35 show apartments in Santiago, Chile, with detailed results for four of the apartments. Based on their research, the authors conclude that the tool holistically assesses the performance of accessible features. Moreover, the tool can be used to inform the early stage of the dwelling design process, as well as used in POE. Their subsequent research (Valderrama-Ulloa et al., 2024) provides a checklist of architectural and design features that reduce obstacles to home activities.

3.8 Practitioner guidance and information provision

An extensive range of detailed information and specification of accessible features are available across the jurisdictions covered by the literature. Design guides and acceptable solutions provide detailed information and specifications for accessible features. These resources explain how practitioners can achieve accessibility that meets accreditation, standards, or regulations. Examples of design guidance include Livable Housing Design guidelines (Australia)[7], Home Design Guidelines Ireland, and Lifetime Homes Standard, United Kingdom.

Denizou (2016) reports that Norway supplements a national system of building codes and regulations with recommendations and guidelines at a municipal level. In addition to national guidelines associated with regulatory standards, municipalities publish further guidance. Norway also uses 'pre-accepted' solutions as a way of improving practitioner knowledge and improving implementation and effectiveness of accessible design. Guidelines contain pre-accepted solutions that satisfy building code requirements. Other solutions can be used, but must be shown to comply with regulations.

Several references note that most accessibility guidelines focus on physical impairments and lack guidance on meeting other needs such as sensory and cognitive (Denizou, 2016; James and Saville-Smith, 2019; Lakhani et al., 2019; Pierce et al., 2015; Plouin et al., 2021; Rooney et al., 2018; Sinclair et al., 2020; Wiesel et al., 2015). Rooney et al., (2016) comment that existing guidelines could be improved through greater awareness and integration of supplementary guidelines, for example for visual and other sensory impairments.

3.9 Public and industry promotion

Promotional activities are used to raise awareness and help to address the significant challenges in improving the acceptance of accessible design among resistant sector actors. Negative attitudes and stigma towards accessible design are evident not only among the public, but also among building professionals (Bringolf, 2011; Hall, 2015; James and Saville-Smith, 2019; Liebermann, 2013; Park, 2014; Ward et al., 2014).

Examples of promotional activities to raise understanding and support for accessible design include demonstration projects, architectural competitions and public information campaigns (Liebermann, 2013; Plouin et al., 2021; Ward, 2013). Denizou (2016) suggests that architectural competitions can not only be used to promote accessible design, but also to lift sector standards through driving best practice.

Such activities are mainly aimed at raising the profile and appeal of accessible design in the private market. An example of a national information campaign is Every Australian Counts, a grassroots campaign launched in 2011 to endorse the NDIS and achieve public support (Wiesel and Habibis, 2015). Another Australian example is the provision of information and advocacy through the Australian Network for Universal Housing Design (Ward, 2013). Plouin

[7] Australia has also produced other design guides including: Livable Housing Design Handbook, Better Apartment Design Standards (Victoria), Apartment Design Guide NSW Part 4, Housing for Life: Designed for Living (South Australia), and HIA Guide to Livable Housing Provisions (personal communication, Jane Bringolf, Centre for Universal Design, Australia).

et al., (2021) report that in 18 countries, public authorities provide housing information, expertise and advice to people with disabilities and their families.

Another way of providing information and promoting accessible housing is through registers of accessible stock. Registers operate in Australia, the Netherlands, England and Scotland, for example (Aimers et al., 2021; Callaway et al., 2020; Crowe et al., 2024, Wiesel et al., 2015; Wiesel & Habibis, 2015).[8] Although registers, of themselves, do not increase the provision of accessible stock, they nevertheless meet a need for more consumer information about the availability of accessible stock, including location, the types of accessible features provided and vacancies. Moreover, registers can be used to collect data that is useful when raising awareness of the nature and extent of the shortfall in the supply of accessible housing (Aimers et al., 2021; Callaway et al., 2020; Crowe et al., 2024; Stewart, 2021).

3.10 Interventions targeted to specific populations

A key question in the rapid review was whether any interventions specifically address the accessibility needs of older people. Another question was concerned with interventions for improving housing accessibility in both owner-occupied and rental tenures. The investigation revealed a scarcity of interventions specifically supporting older people's needs, and also showed tenure differences in interventions. The invisibility of culturally-informed accessible design, particularly for indigenous communities, was also highlighted.

Interventions addressing the accessibility needs of seniors

In general, interventions identified in the review are not specifically designed to support the accessibility needs of older people; rather most interventions are focused on the disabled population (e.g., Australia's NDIS and SDA interventions), or the general population including older people (e.g., accessibility regulations covering new-build stock). DesignABLE Inc. (2020) and Park (2014) provide case studies of new residential developments that incorporate accessibility requirements in mainstream housing for the general population.

A few interventions targeted to the older population were identified, primarily associated with social or affordable rental housing stock. There are such programmes in the USA, intended to subsidise rental housing adapted to the needs of low-income seniors (Plouin et al., 2021). In Australia some local authorities have developed accessible housing for seniors (Bringolf, 2011). Ward (2013) describes residential developments funded through the Australian Government's Nation Building Economic Stimulus Plan, which required dwellings to facilitate accessibility features such as reinforced bathroom walls and toilet walls, for persons with disability and older people.

Despite the increasing significance of the home as the base for the delivery of health and social services, there is almost no consideration of how accessible design could be promoted to enhance delivery, nor how housing functionality affects both the level and effectiveness of home-based care (Hall, 2015).

Tenure differences

Regulations requiring accessibility in public rental housing are more prevalent than regulations pertaining to private rental stock and owner-occupied housing. This is due to accessibility regulations applying to some types of social and affordable housing,

[8] We have received advice from Kāinga Ora, that they are investigating the potential to develop a housing register for their own stock.

accessibility requirements attached to public funding for the construction of that stock, and/or targeting of accessible stock to disabled people or seniors (Aimers et al., 2021; Bringolf, 2011; DesignABLE Inc., 2020; Douglas et al., 2023; Hall, 2015; Heller et al., 2022; Liebermann, 2013; Pierce et al., 2015; Rooney et al., 2018; Stewart, 2021; Tucker et al., 2022; Ward and Franz, 2015; Ward and Jacobs, 2016; Wiesel, 2020).

Sometimes private stock, both rental and owner-occupied, is not covered by accessibility regulations. For example, often stand-alone single-family housing is exempted (Bowley and Sinclair, 2018; Hall, 2015; Liebermann, 2013; Leonard, 2022; Plouin et al., 2021; Wilkinson et al., 2018). Nevertheless, there are examples of private housing built with accessible design, achieved through regulation, planning rules and financial incentives (DesignABLE Inc., 2020; Hall, 2015; McGill et al., 2019; Park, 2014).

An added challenge for tenants who need accessible features is that alterations to improve accessibility are hard to achieve in existing rental dwellings, as landlords are often reluctant to pay for modifications even if the tenant may be able to access funding for such improvements (Plouin et al., 2021; Tually et al., 2022; Wiesel, 2020). Where tenants may legally undertake reasonable modifications themselves, as in Australia, they are often required to return the property to its original state when they leave. The costs of both installing and removing modifications is a disincentive to improving accessibility (The Centre for International Economics, 2021; Wiesel and Habibis, 2015).

Cultural aspects and housing accessibility

Few core references concerned the accessibility needs and design of housing for ethnic and indigenous communities. Sarkodee and Martel (2018) note that there is little research into appropriate housing design for indigenous peoples with disability. Similarly James (2019) found a dearth of research about the housing needs and building design solutions for Māori and indigenous elders with dementia. Two dementia-friendly indigenous building design guides were found, however both were concerned with spatial design in residential care facilities, not with accessibility in mainstream housing. Sixteen building design principles for housing for older Māori and indigenous people were collated from the literature.

The literature notes poor alignment of accessibility interventions with the values, housing needs and health and social services needs of ethnic and indigenous communities, particularly support for family caregivers (Bowley and Sinclair, 2018; Grant et al., 2017; James 2019; Sarkodee and Martel, 2018; Wiesel and Habibis, 2015; Wiesel et al., 2015).

4. Evidence of effectiveness of interventions

Robust investigation into the effectiveness of interventions is scarce, with few evaluations available. However, several studies included data on increases in accessible stock, and presented evidence on improvements in dwelling functionality, resident wellbeing and satisfaction due to accessible design in new-build stock. While direct causal links between interventions and outcomes are difficult to establish (NZIER, 2017), the studies described in this section contribute to the evidence base about housing accessibility outcomes.

4.1 Increases in accessible stock numbers

Two case studies provide information about increases in accessible stock numbers. In both instances the interventions facilitating growth in accessible stock were mandatory accessibility requirements related to funding (DesignABLE Inc., 2020; Park, 2014).

Evidence of outcomes from the Bridgwater developments suggests that financial support from public bodies and planning rules and incentives can be effective in raising the numbers of accessible stock. These developments also benefitted from the public authority undertaking land and infrastructure development to facilitate the construction of level entry dwellings. Accessibility was incorporated into the Bridgwater land use plan for both public/community facilities and residential housing. A high proportion of dwellings comply with the VisitAble standard; two of the three housing developments have over 50% VisitAble homes. These neighbourhoods were the fastest selling subdivision in Winnipeg (Park, 2014).

DesignABLE Inc. (2020) conducted 11 case studies of MURB developments funded through public agencies. One housing redevelopment incorporating accessible design increased dwellings from 11 to 45. In another development, 100% of units meet the Ontario Building Code barrier-free requirements and 20% exceed the Ontario Building Code minimum requirements. In a third development, 100% of units are accessible or barrier free. The report found that the non-profit sector is the most active in building accessible stock, taking advantage of partnerships and financial support. Other studies have also found not-for-profit housing providers taking the lead in building with accessible design, in NZ and Australia (James, 2024; Wiesel and Habibis, 2015).

Data on the impacts of planning rules on the provision of accessible stock is provided by McGill et al. (2019), reporting on the extent to which Local Plans in England can be expected to deliver accessible housing. The authors reviewed those plans to calculate an average annual delivery rate for the number of new homes to be delivered according to each plan between 2019-2030, and of those, the number that would be delivered to accessible standards if the plan were fully implemented. They found considerable variation in what would be delivered, depending on accessibility standards required. Less than half of all local plans set specific requirements for a percentage of new homes to be built to accessible or adaptable standards. Less than one-fifth of the plans set requirements to wheelchair user access standards. Across the country, it is forecast that 776,608 homes will be specified to meet an accessible, adaptable standard. However, this number is considerably lifted by the London Plan accessibility requirements. Outside London, 23% of new homes are set to meet access standards and only 1% are set to be wheelchair accessible dwellings.

Hall (2015), reporting on mandatory ordinances and programmes in the USA, found that these have been moderately successful nationwide. It was found that the second, third, and fourth largest supply of visitable homes were in cities with mandatory ordinances. One example was Pima County, Arizona where a mandatory visitability ordinance introduced in 2007 resulted in the construction of more than 15,000 visitable homes by 2009.

There is some evidence of an increase in accessible stock in Australia achieved through the SDA funding for housing construction for disabled people (Aimers et al., 2021; Callaway et al., 2020; Madhavan et al., 2021). Aimers et al. (2021) reported that, as of June 2021, 2,366 places funded through SDA were under development, across 1,661 dwellings. Apartments were the dominant building type being developed, although the proportions of other housing types were increasing. More than half of places were being developed by private housing

providers. Douglas et al. (2023) concluded that SDA funding has seen a significant increase in new apartments for people with disability since 2016. Crowe et al. (2024) reported that between 2017 and Dec 2022, a total of 7,451 dwellings had been delivered nationally through the SDA programme, however only 44% appeared to be new-builds.

4.2 Evidence of improved dwelling functionality

Evidence of improved dwelling functionality and improved resident wellbeing due to accessibility is provided in a few studies.

Surveys of residents of the Bridgwater developments in Winnipeg showed benefits related to easy access to and within the house, an accommodating and safe home environment for residents of all ages, and a welcome environment for visitors with diverse needs (Park, 2014).

In a NZ study, Saville-Smith et al., (2016) reported on 33 interviews with householders living in Lifemark accredited homes. Those residents commented that their current home performed better than their previous home on several indicators: moving in and around the home, doing housework, comfort and heating. Eighty percent of those participants said that the positive difference their Lifemark home had made for them was ‘a lot’. Notably, of the 33 dwellings, the largest number (22) were developed by community housing providers for social and affordable housing, rather than by private developers.

Douglas et al., (2023) conducted interviews with 15 disabled residents of new-build apartments funded through the NDIS. According to quantitative self-report measures, the total wellbeing ratings of two-thirds of residents had moved in a positive direction with three participants showing reliable and clinically significant improvement and no participant showing negative change. Residents also reported a greater level of community integration post-move compared to pre-move.

In a Northern Ireland study, Rooney et al., (2018) conducted in-depth interviews with 12 visually impaired people living in Lifetime homes. Participants felt more confident in their homes, compared to outside their homes or in the homes of others. Some aspects of Lifetime homes met the needs of participants, but not all. Participants were satisfied with storage space, but found that lighting requirements were not always met, and that shower rooms were often too small for wheelchair users, or to accommodate carers’ needs.

4.3 Impacts of a mandatory baseline with diverse mechanisms

There is general agreement in the literature reviewed that mandatory approaches such as legislation, building regulations and planning rules are effective but insufficient for increasing housing accessibility. As noted above, there is evidence of increases in accessible stock due to such interventions, but numbers are below what is required to meet growing needs driven by population ageing and increased disability prevalence. The persistent undersupply of accessible stock to meet current needs, let alone future needs, is common across different jurisdictions, including those with regulatory requirements (Bowley & Sinclair, 2018; Denizou, 2016; Heller et al., 2022; Liebermann, 2013; Lindsay et al., 2024; McGill et al., 2019; Sinclair et al., 2020; Tucker et al., 2022; Valderrama-Ulloa et al., 2023; Wiesel, 2020).

Often the potential impacts and benefits of mandatory approaches are held back by lack of industry capability. The need for industry upskilling has been identified as a critical strategic gap (Lakhani et al., 2019). Moreover, shortcomings in guidance and specifications, including

a lack of consistent national specifications, are key issues that need addressing to increase the effectiveness of mandatory interventions (Bowley and Sinclair, 2018). Another area considered to reduce the impact of mandatory interventions, is the focus on minimum accessibility requirements and limits on the housing types that standards apply to (Denizou, 2016; Hall, 2015; Heller et al., 2022; Liebermann, 2013; Plouin et al., 2021; Rooney et al. 2016). Furthermore, a lack of monitoring of compliance with accessibility standards and enforcement of requirements can erode the effectiveness of mandatory requirements (Larkin et al., 2015; Lindsay et al., 2024; NZIER, 2017; World Health Organization, 2021).

Modifications to existing stock is the dominant policy response to increasing housing accessibility in various jurisdictions, including NZ. However, the reliance on retrofitted modifications has not been effective in increasing stock numbers nor improving dwelling functionality (Stewart, 2021; Ward and Bringolf, 2022; Wiesel, 2020). Home modifications policies have been criticised due to challenges in needs assessment, insufficient funding, structural limitations of existing dwellings that may prevent modifications, and ineffective or poorly installed modifications (MacLachlan et al., 2018; Stewart, 2021; Wiesel, 2020). Furthermore, home modifications are far less likely to be installed by landlords, even when the tenant can access funding for modifications, thus making rental housing potentially unviable for people as they age (Tually et al., 2022; Wiesel, 2020; Wiesel and Habibis, 2015).

There is evidence across the literature that sole reliance on voluntary responses is not effective in delivering a supply of accessible housing and cannot substitute for regulatory measures (Plouin et al., 2021; Ward and Jacobs, 2016). Countries have been slow to adopt universal design standards (Tucker et al., 2022; Valderrama-Ulloa et al., 2023) and there is little incentive when adoption is voluntary.

Australia's experience of transitioning from a voluntary accessibility agreement to a regulatory framework, illustrates the failure and implications of relying on voluntary responses (Callaway and Tregloan, 2018; Galbraith, 2018; Larkin et al., 2015; Liebermann, 2013; Ward, 2013; Ward and Bringolf, 2018; Ward and Bringolf, 2022; Ward and Jacobs, 2016; Ward and Franz, 2015; Ward et al., 2014; Wiesel, 2020; Wiesel and Habibis, 2015). These attempts to make voluntary measures work have occurred over years in a jurisdiction often used as a comparator or benchmark with ours (Ministry of Social Development, 2023; NZIER, 2017; Stewart, 2021).

Australia's Livable Housing Design Agreement is a comprehensive national strategy incorporating an accessibility standard and guidelines, which was endorsed by both industry and government. Despite extensive technical guidance, advocacy, and educational programmes, it had little impact. This voluntary approach neither increased consumer demand, nor led to transformation within the industry (Larkin et al., 2015; Wiesel and Habibis, 2015). One study nevertheless concluded that the Livable Housing Design guidelines have played an important developmental role through fostering deeper industry understanding of the need for accessibility and how it can be provided. This has contributed to eventual acceptance of the need for legislation (Ward et al., 2014). Australia’s experience is discussed further in Appendix E.

The failure of voluntary interventions, and the slow gains achieved through mandatory measures, are evident. There is broad agreement across the literature that multiple responses, both mandatory and voluntary, are needed to increase the number and quality of accessible new-build stock. Both supply-side and demand-side interventions are needed.

(Bringolf, 2011; Denizou, 2016; James, 2024; Lund and Bringa, 2016; Saville-Smith et al., 2016; Štaube et al., 2016; Wiesel and Habibis, 2015; World Health Organization, 2021).

The literature summarized in the baseline review (Appendix C) also noted mixed evidence on the efficacy of interventions, even in contexts where accessibility is mandatory. The baseline review reported evidence of improved accessibility and functionality due to the installation of accessible features, however most evidence is from home modifications literature. Internationally, the inclusion of accessible design in new-builds has been shown to have similar benefits to modification of existing dwellings, with the additional benefits of reducing the need for, and public costs of, retrofitting modifications over time.

The baseline review found that the most successful ways of encouraging accessibility in new-builds were building regulations that were strongly enforced, and financial and planning incentives for private sector housing developers. The least successful interventions were voluntary guidelines, universal design branding for marketing purposes and information campaigns. A multi-pronged strategy was considered to be the most effective. Legislation and regulation are necessary to effect change, while voluntary accreditation, informational levers and incentives are important for increasing knowledge and take-up. However, non-mandatory approaches are insufficient and often ineffective on their own. Whatever the mix of instruments, they should be customised to the jurisdiction's specific institutional, market, social and cultural characteristics.

Examples of multiple approaches

In 2007 Ireland established the Centre for Excellence in Universal Design as part of the National Disability Authority. The Centre is a champion for accessibility situated within government. Other initiatives include regulation, housing accessibility standards and guidelines and universal design education and professional training.

Norway has taken a cross sectoral approach to accessibility, based on collaboration between ministries, normalization of Universal Design and a firm grounding in a human rights framework. Guidelines provide specifications and 'pre-approved' solutions for new build dwellings but are open to tailoring to individual needs. User centred design, collaboration and UD programmes within educational institutions have been vital to mainstreaming UD and funding is made available for this purpose. As well as a national strategy, steering documents, regulation, guidelines and funding, UD has been supported by the Norwegian Housing Bank.

5. Enablers and barriers

This section describes the factors and conditions that present a barrier to achieving accessible new-build stock, or enable their delivery. Content analysis of the core references identified 20 enablers and 30 barriers.

Barriers and enablers are often connected. The literature notes a lack of certain conditions or actions as a barrier, while the existence of those factors can be an enabler. For example, lack of legislation and regulations are identified as barriers, while their introduction is found to be an enabler. Similarly, the literature examines policy and planning settings, information provision, and industry capability in relation to both barriers and enablers.

The findings of the rapid review about enablers and barriers resemble the findings of the Baseline Review (Appendix Table C.2 in Appendix C). The baseline review identified both

enablers and barriers in key domains of legislation and regulation, central and local government, industry and consumers.

5.1 Enablers

In all, 20 enablers were identified through an examination of the core references. Appendix F, Appendix Table F.4, lists the references associated with each enabler. Only a selection of references is provided in the following discussion.

The most common enablers cited are:

- Legislation and regulation.
- Professional development and training in the building and construction industry.
- Funding and financial incentives for construction.
- Public promotion campaigns.

Legislation and regulation

The most consistently mentioned enabler in the literature is legislation and regulation that sets out mandatory accessibility standards. There is evidence of support for mandatory requirements across sectors and stakeholders, including industry. Mandatory requirements are seen by the industry to minimise risk, reduce complexity, increase certainty and maximise efficiency (Galbraith, 2018; James, 2024; Ward, 2013; Ward et al., 2014).

There is also support for expanding regulations in jurisdictions that have minimal accessibility requirements covering a minority of the housing stock (Bowley and Sinclair, 2018; Liebermann, 2013; Plouin et al., 2021).

The literature identifies monitoring and enforcement of regulations as critical for successful implementation of mandatory requirements (DesignABLE Inc., 2020; Lindsay et al., 2024; NZIER, 2017; World Health Organization, 2021). There is some support for the use of assessment tools such as POEs to monitor compliance with regulations (Rooney et al., 2016; Valderrama-Ulloa et al., 2023).

Professional development and training

Professional development, education and training are considered essential components of increasing knowledge and skills in accessible design and implementation, and the use of accessibility assessment instruments. Industry education is identified by professionals as one of the most common facilitators of universal design (Bringolf, 2011; Busby and Harrison, 2018; James and Saville-Smith, 2019; Lakhani et al., 2019; Park, 2014; Pierce et al., 2015; Rooney et al., 2016; Shahrom and Zainol, 2015; Tucker et al., 2022).

There is some support for a single accreditation system as part of increasing industry capability, on the grounds that this would reduce confusion, increase skills and promote consistency across the housing sector, both in build practices and assessment of accessibility efficacy (NZIER, 2017; Saville-Smith et al., 2016; Stewart, 2021).

Associated with professional development, is the provision of design guidance, good practice examples, acceptable solutions, cost-effective solutions, cost-benefit analysis, building life-cycle analysis and other information that assists in assessing feasibility and developing business cases for accessible housing (Callaway and Tregloan, 2018; Liebermann, 2013; Lund and Bringa, 2016; Stewart, 2021; Ward and Franz, 2015).

Several studies noted the importance of acceptable solutions, which specify construction methods that comply with accessible standards. Such solutions ensure certainty, consistency and reduce risk (Denizou, 2016; James, 2024; Saville-Smith et al., 2016; Stewart, 2021).

As a means of increasing market take-up of accessible design, studies suggest the development of mainstream products, designs and pre-fabricated or modular systems that are easy to use and compatible with usual construction practices (Bowley and Sinclair, 2018; Galbraith, 2018; Saville-Smith et al., 2016). Demonstration projects are identified as a means of showing the advantages of universal design features, and how they can be easily achieved (Bringolf, 2011; DesignABLE Inc., 2020; Callaway and Tregloan, 2018; Liebermann, 2013; Plouin et al., 2021). However, Liebermann (2013) cautions that demonstration projects have made only modest gains in generating interest in accessible design.

Funding and financial incentives

Studies identify funding and financial incentives as enabling housing accessibility, through provision of financial support for both housing suppliers and consumers. Funding provision for suppliers is critical for establishing sustainable funding streams and thus ensuring a pipeline of supply of accessible stock (Aimers et al., 2021).

As noted in Sections 3 and 4, accessible stock can be achieved through procurement practices of government agencies that require publicly-funded housing to include accessibility (DesignABLE Inc., 2020; Plouin et al., 2021; Sarkodee and Martel, 2018; Tucker et al., 2022; Ward, 2013; Ward and Franz, 2015; Wiesel and Habibis, 2015).

Studies also note that mortgage finance for accessible new-builds is a way of encouraging consumers to use accessible design (DesignABLE Inc., 2020; Ward, 2013).

Promotion

Provision of public information is seen as a key lever for creating long-term, community-wide change and normalizing accessible design within mainstream housing. This is seen as a way to counter stigma, and to promote awareness and knowledge of accessible design (Hall, 2015; Shahrom and Zainol, 2015; Wiesel and Habibis, 2015; Tucker et al., 2022).

Persistent stigma has led some studies to examine the negative discourse around accessibility, particularly its association with specialised housing for disabled people, an institutionalised appearance rather than homeliness and comfort, dependence rather than independence, separation rather than inclusion, and restriction rather than choice (Grangaard and Gotlieb, 2019; Jonsson et al., 2021; Larkin et al., 2015; Liebermann, 2013; Tucker et al., 2022). That is why some advocate for the use of inclusive design or universal design in preference to other terms (Hall, 2015), and countries such as Norway and Ireland have strategically adopted the term universal design, which is seen to apply to the whole population, to normalise design standards, and to be based on user involvement (Busby and Harrison, 2018; Lund and Bringa, 2016; Denizou, 2016).

Other enablers

Several references focus on the role of public and cross-sectoral leadership and collaboration to achieve housing accessibility (Lund and Bringa (2016; Madhavan et al., (2021; Ward, 2013; Ward and Bringolf, 2022; World Health Organization, 2021). Others note

the importance of coordinated approaches, and clearly defining the roles of local and central government in supporting housing accessibility (Crowe et al., 2024; Heller et al., 2022).

End-user engagement in design and review is seen as another enabler, with references suggesting user advisory panels, along with improved engagement and collaboration with stakeholders in accessible design and accessibility assessment (Lakhani et al., 2019; Larkin et al., 2015; Lindsay et al., 2024; Madhavan et al., 2021; Rooney et al., 2018; Wiesel et al., 2015.

According to several studies, comprehensive accessibility supply and demand data is an enabler that underpins other interventions (Aimers et al., 2021; McGill et al., 2019; Stewart, 2021).

5.2 Barriers

Thirty barriers were identified in the core references. These are presented in Appendix F, Table F.5, which lists references associated with each barrier. Only a selection of those references is provided in the following discussion.

In the main, the barriers mirror the enablers. The most frequently cited barrier is a lack of legislation and regulation. Other barriers identified include information, industry, financial, and planning barriers.

Lack of legislation and regulation

Across the literature, the absence of legislation or regulation was identified as a significant barrier (Bringolf, 2011; Galbraith, 2018; Stewart, 2021; McGill et al., 2019). Some studies emphasise that a pervasive reliance on home modifications policy and voluntary approaches to deliver housing accessibility has inhibited progress on achieving accessibility in mainstream stock (Larkin et al., 2015; The Centre for International Economics, 2021; Ward and Bringolf, 2022; Wiesel 2020).

Inadequate legislation covering only minimum requirements, such as visitability requirements, or gaps in coverage of all tenures and housing types was also found to inhibit the production of accessible housing (Bowley and Sinclair, 2018; Hall, 2015; Liebermann, 2013). Some references suggest that minimum or limited requirements may encourage convergence around base standards, rather than encouraging higher performance and innovation (Heller et al., 2022; Larkin et al., 2015; Tucker et al., 2022).

Associated with legislative shortcomings is a lack of policy direction and leadership to embed accessibility principles and standards in policy (Heller et al., 2022; Larkin et al., 2015; Sarkodee and Martel, 2018; Ward and Bringolf; 2018). Several references identify policy changes and confusing policy as impeding progress on achieving housing accessibility (Aimers et al., 2021; Bringolf, 2011; Lakhani et al., 2019; Madhavan et al., 2021; Ward, 2013).

Information barriers

Information barriers is a strong theme throughout the literature, which identifies information gaps and ambiguities, low awareness of the individual and public benefits of housing accessibility, stigma and negative attitudes, and erroneous perceptions of costs as inhibitors of uptake of accessible design (Liebermann, 2013; James and Saville-Smith, 2019; Ward et al., 2014).

Lack of clear and consistent design specifications, standards and acceptable solutions are deemed a brake on uptake on accessible design, and a key factor impeding industry capability (Denizou, 2016; Lakhani et al., 2019; James, 2024; Madhavan et al., 2021; NZIER, 2017; Plouin et al., 2021; Saville-Smith et al., 2016). In Australia, a plethora of different design specifications and guidelines have emerged to fill a gap due to lack of legislated standards (Bringolf, 2011; Ward, 2013). Research in Canada, Ireland and Northern Ireland note that a variety of standards and guidelines can result in confusion and complicated processes (DesignABLE Inc., 2020; Pierce et al., 2015; Rooney et al., 2016).

Several studies have found that there is a lack of knowledge in both the industry and among the public of the actual costs of accessible design and cost-effective solutions. A common barrier to accessible design identified in the literature, is the erroneous perception of excessive costs (Bowley and Sinclair, 2018; James, 2024; Larkin et al., 2015; Lindsay et al., 2024; McGill et al., 2019; Park, 2014; Sinclair et al., 2020; Ward, 2013). This is connected to price sensitivity and developers' decisions about project feasibility, which are widely considered to present a significant barrier to increasing accessible housing stock (Bowley and Sinclair, 2018; James, 2024; Lakhani et al., 2019). To counteract the erroneous perceptions of cost, several studies suggest that accurate feasibility modelling and exemplars could demonstrate the range of actual costs of accessibility across different housing types. Extended use and lifecycle benefits of accessibility could also be measured (Bowley and Sinclair, 2018; DesignABLE, 2020; Plouin et al., 2021). Ward and Bringolf (2022) note that the social and public benefits of accessible design, as well as housing lifecycle benefits are often undercounted.

In a counter to erroneous cost perceptions, DesignABLE Inc. (2020) reports on housing projects ranging from standard design to Universal Design examples. The study demonstrated that the Universal Design example was comparable and affordable, particularly when considering per-unit costs. Other analyses of build costs show that universal design and visitable features have no or minimal additional costs (McGill, 2019; Saville-Smith et al., 2016).

Some references suggest that a lack of data hinder the development of mainstream accessible housing (Crowe et al., 2024; DesignABLE, 2020; McGill et al., 2019; Stewart, 2021; Wiesel et al., 2015). There is limited need and demand data, data on the nature of accessibility in existing stock, and development pipeline data (Aimers et al., 2021; Madhavan et al; 2021). Tenure-related accessibility data is practically non-existent (Plouin et al., 2021). Furthermore, data that is collected is often of poor quality, limited in coverage (by location and by housing types), and data collection methods are inconsistent (Plouin et al., 2021).

A few references note a lack of objective accessibility measures and assessment tools as a factor impeding the development of a knowledge base about the need for accessibility, assessing compliance with accessibility standards, and obtaining evidence of improved dwelling functionality (Mosca and Capolongo, 2018).

Industry barriers

Various structural, resource and attitudinal barriers were observed in the building and construction industry. The main barrier identified is the lack of industry knowledge, capacity and capability to implement accessibility (Busby and Harrison, 2018; Crowe et al., 2024; Denizou, 2016; Larkin et al., 2015; Lund and Bringa, 2016; Park, 2014; Plouin et al., 2021; Tucker et al., 2022; Ward and Jacobs, 2016; Wiesel, 2020).

Some references comment on poor industry understanding of the purpose of universal design and accessibility, alongside scant awareness of end-user requirements, including different disability needs (Bringolf, 2011; Lakhani et al., 2019; Lindsay et al., 2024; Rooney et al., 2016; Rooney et al., 2018; Shahrom and Zainol, 2015; Ward; 2013).

Few references comment on indigenous and cultural aspects of accessible design, but those that do noted that the lack of attention to cultural perspectives reduces choice and control over housing, and consequently impacts on seniors' ability to age in place (James, 2019; Sarkodee and Martel, 2018; Wiesel and Habibis, 2015; Wiesel et al., 2015).

The literature consistently refers to industry inertia and resistance to accessible design. Despite the widespread provision of design specifications and guidance, some studies argue there is lack of take-up due to a deep-seated aversion to change within the industry (Bowley and Sinclair, 2018; Callaway and Tregloan, 2018; Heller et al., 2022; Larkin et al., 2015, Lindsay et al., 2024; Park, 2014; Ward and Bringolf, 2018; Wiesel, 2020). Other research identified specific factors contributing to industry resistance, including perception of risk, a focus on short-term, upfront costs and profit margins, and concerns about the marketability of accessible design (James, 2024; Lakhani et al., 2019; Liebermann, 2013; Sinclair et al., 2020; Tucker et al., 2022; Ward and Bringolf, 2022; Ward and Franz, 2015; Ward and Jacobs, 2016).

Although it is a pervasive view among the industry and the public that market demand and consumer preferences drive supply, research has found that consumers face industry barriers to expressing a preference for accessible housing. Such barriers include a dearth of accessible-design homes on the market, difficulties negotiating their home design with builders, and poor workmanship (Bringolf, 2011; Liebermann, 2013; Lindsay et al., 2024; Ward and Bringolf, 2018; Wiesel, 2020). Other studies suggest that actual consumer demand is stifled by a narrow focus on specialised housing for people with high accessibility needs, or expectations that it is a government responsibility to provide accessibility through public housing (Wiesel, 2020).

Financial barriers

The literature identifies a lack of access to funding, as well as lack of financial incentives for construction of accessible dwellings as fundamental inhibitors of industry take-up of accessible design (Aimers et al., 2021; Callaway et al., 2020; Douglas et al., 2023; Lakhani et al., 2019; Sarkodee and Martel, 2018; Ward, 2013; Ward and Franz, 2015; Wilkinson et al., 2018; World Health Organization, 2021).

In their scoping review of studies covering 18 countries, Lindsay et al. (2024) found that most of the financial incentives are aimed at individuals, e.g., in the form of financial support to install modifications. Much less attention is paid to financial incentives for builders and other housing stakeholders to provide accessible housing.

Some studies also found that financial constraints on householders affect their ability to use accessible design in new-builds and renovations (Callaway et al., 2020; Galbraith, 2018; Lakhani et al., 2019; Štaube et al., 2016; Ward and Bringolf, 2018; Wiesel and Habibis, 2015).

Planning barriers

Planning and consenting/permitting impediments are noted as fundamental barriers preventing housing being built with accessible features in some jurisdictions.

The main issues identified in the literature are challenges around achieving level entry (such as unclear or conflicting requirements), planning rules that constrain the development of smaller, higher density housing and innovative housing, and delays in consenting processes (Bowley and Sinclair, 2018; James, 2024; Rooney et al., 2016; Sinclair et al., 2020; Ward, 2013; Wiesel and Habibis, 2015).

Questions are also raised in the literature about accessible design knowledge and capability within planning and consent authorities and among certifiers. The effectiveness of monitoring and enforcement of accessibility regulations is also questioned (Bringolf, 2011; Crowe et al., 2024; Larkin et al., 2015; Lindsay et al., 2024).

6. Application of findings to New Zealand

A key objective of the rapid review is to consider what NZ can learn from international interventions intended to increase accessible stock numbers and functionality. We should nevertheless exercise caution in considering overseas models for NZ because of the differences in housing stock characteristics, housing markets, structure of building costs, legislation, policy and planning frameworks across various jurisdictions. Interventions developed and implemented elsewhere that demonstrate effectiveness should be considered, although with adaption to NZ's institutional, market, social and cultural characteristics.

As a way of considering the applicability of interventions to NZ, participants in the expert workshop (Appendix D), were provided with a summary of findings from the rapid review and asked for their views on the range and types of interventions, whether they were surprised by any of the findings, the applicability of the findings to NZ and the information needed about housing accessibility.

Workshop participants were familiar with the findings and did not find them surprising. The rapid review broadly confirmed what they knew from their own research and practice. The only finding that was somewhat surprising to participants was that internationally, little attention is paid to the needs of home-based carers in the design and implementation of accessibility.

Workshop participants noted that the domains of housing accessibility, and dwelling condition and energy performance share similar challenges. These include the challenges in encouraging industry take-up of accreditation, informational guidance and other tools, and raising public and industry understanding of benefits. However, a critical difference between those areas was pointed out. There are regulations requiring standards to be met for dwelling condition and energy performance whereas there are no regulations requiring accessibility in private dwellings.

Workshop participants considered the lack of a regulatory framework promoting accessibility to be major gap in housing and building policy, given the impacts of both population ageing and the increasing prevalence of disability on housing. There was acknowledgement that most new housing is built in the private market, and therefore interventions need to focus on both requiring and encouraging the private sector to take-up accessible design.

Workshop participants suggested that NZ should introduce accessibility regulations, along with incentives and supporting mechanisms such as:

- Standardisation of accessibility requirements across councils.

- A national body mandated to promote accessibility and coordinate key stakeholders.
- Certification, professional education and training.
- Advocacy and public campaigns promoting accessibility.
- Information on the actual costs of different accessibility designs and products.
- Modular solutions for accessible features.

6.1 Policy and practice implications

There are clear policy and practice implications from the rapid review and the baseline review. Analysis of enablers and barriers provides information about how and where to focus efforts to increase housing accessibility. Similarly, there are examples of effective interventions that could inform a NZ approach. There is also information about the development and use of accessibility assessment tools that would strengthen existing dwelling assessment tools used in NZ.

Many of the enablers and barriers identified in the rapid review and in the baseline review are relevant to NZ. The main enablers are: legislation and regulation, professional development and training in the building and construction industry, funding and financial incentives for construction, and public promotion campaigns on the benefits of universal design. The main barriers are: lack of legislation and regulation, lack of clear and consistent accessible design specifications, lack of funding and financial incentives for construction of accessible dwellings, and lack of industry capacity and capability.

The literature consistently argues that the most effective responses are mandatory requirements, including legislation, regulation and planning requirements. Various studies provide examples of how legislation and regulations are used to effect (e.g., Heller et al., 2022; Liebermann, 2013; Lund and Bringa, 2016; Plouin et al., 2021). Reliance on voluntary approaches for new-builds and home modifications in existing dwellings have had no appreciable effect on increasing housing accessibility.

Mandatory requirements are especially important to ensure that private sector housing stock, both owner-occupied and rental, is covered. Since 20% of NZ's population aged 65 and over are tenants, and primarily living in private rentals, it is critical for ageing well that private sector stock is suitable for them. However, as shown in Section 3, there is an international tendency to require provision of accessibility in public rentals but not in private stock, due to regulatory requirements and public procurement in various jurisdictions.

Although regulation is effective, mandatory requirements alone are insufficient for increasing housing accessibility. Multiple responses are needed to increase the number and quality of accessible new-build stock (Lund and Bringa, 2016). Financial support through funding (including capital funding), financial incentives and government procurement, have increased numbers of accessible stock (e.g., DesignABLE Inc., 2020; Douglas et al., 2023; Hall, 2015). There is also evidence of the positive impact of planning requirements in increasing housing accessibility (e.g., Liebermann, 2013; McGill et al., 2019; Park, 2014; Sinclair et al., 2020). The provision of accreditation, detailed design guidance and trades training, specifications, easy-to-use products and acceptable solutions all support the construction of accessible stock (e.g., Aimers et al., 2021; Bowley and Sinclair, 2018; Denizou, 2016; Liebermann, 2013).

The Australian experience of moving from voluntary interventions to regulation (Appendix E) provides useful insights for NZ. Those include:

- The limited impacts of voluntary responses, which, although having been endorsed nationally and cross-sectorally, failed to achieve significant increases in housing accessibility.
- The necessity for policy, legislative, and regulatory frameworks. These provide certainty and a 'level playing field'.
- The significance of accessibility advocates and champions across sectors that achieved widespread support for change.
- The critical importance of political support and leadership, which considered public and future benefits of increasing housing accessibility.
- The necessity for robust, comprehensive design guidance to support implementation of accessible design.

A few references are relevant to the development of robust assessment tools for evaluating the performance and suitability of accessible features (Mosca and Capolongo, 2018; Valderrama-Ulloa et al., 2023; Wilkinson et al., 2018). Participants in the expert workshop pointed out that, while NZ has an objective, nationally used dwelling condition assessment tool, there is nothing similar in relation to dwelling accessibility. The expert workshop also raised the need to extend thinking about accessibility standards and assessment tools to a wider range of needs other than physical accessibility, including sensory and cognitive needs. Several references support that view, providing information on user-centred design (Tucker et al., 2022), and how to extend accessibility requirements in standards and assessment tools (e.g., Rooney et al., 2016; Valderrama-Ulloa et al., 2023; Valderrama-Ulloa et al., 2024).

Policy and practice insights from the rapid review need to be further tested in relation to the enablers and barriers to implementing accessible housing design for Māori. There is a growing body of housing research informed by Kaupapa Māori research methods and perspectives.[9] These highlight Māori values, such as kaitiakitanga (guardianship), manaakitanga (hospitality), and whanaungatanga (kinship), which play a central role in shaping community practices and expectations. These values emphasize a holistic approach to housing that links people, whenua (land), and housing. Accessibility is inherently valued as the dwelling may be intended to be used intergenerationally, serving people of all ages over a long time span.[10] Consideration of barriers impacting on the uptake of accessible housing design in Māori communities must take account of impediments to kaumātua housing development. These involve historical causes due to local and central government actions, which have on-going contemporary ramifications for options around accessibility and functionality of housing design.[11]

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[9] See, for example, Māori housing research in the Building Better Homes Towns and Cities National Science Challenge Papakāinga - Building Better

[10] Tawa, T.I., Donovan, J. & Emery, T. (2024). *Kia Houkura te Kotahitanga: To prosper together through housing for one whānau in Ruatāhuna*. Report for FAAB Small Homes, Building Better Homes, Towns and Cities National Science Challenge. Wellington: FAAB Small Homes, BBHTC. FAAB Small Homes.

[11] Andersen, E., (2024). *Small Homes are our Past and Future: Hapū Experiences and Aspirations*, Report for FAAB Small Homes, Building Better Homes, Towns and Cities National Science Challenge. Wellington: FAAB Small Homes, BBHTC. FAAB-Report-Ngati-Kapu-Final-10-June.pdf (goodhomes.co.nz)

The growing diversity and ageing trajectories of Pasifika and other ethnic communities[12] as well as Māori communities, further underscore the importance of culturally-informed approaches to increase housing accessibility. Ignoring deeply rooted cultural values and perspectives could lead to interventions that are not only ineffective but potentially detrimental, as they might fail to resonate with or meet the needs of these communities.

7. Conclusion

This rapid review's preoccupation with how to increase and improve housing accessibility raises important implications for research, policy and practice, because accessibility is fundamental to achieving a housing stock that is functional and durable for everyone. Accessibility is critical to people's ability to age well in their homes and communities, as well as a key determinant of whether health and social services, care and support can be provided in the home. That is why improving accessibility in mainstream housing, rather than a targeted approach through ad hoc home modifications or the construction of 'specialised' housing is essential to meeting the housing needs of our ageing population.

We used a rapid review methodology to scope the interventions employed internationally to increase and improve accessibility of the housing stock. There is no 'ready-made' body of research to inform this review, but rather a diverse and somewhat fragmented evidence base. By definition a rapid review is limited by time and resources. Of necessity, the scope of literature reviewed was confined to known research sources. This review has used a narrative approach, documenting the range of findings as well as common issues and themes across the literature reviewed.

A common issue experienced in various jurisdictions, is an undersupply of accessible housing. Countries, including those with regulatory requirements, are faced with considerable challenges in increasing accessible stock numbers. A key reason is that the vast majority of new stock is built, and will continue to be built, in and for the private sector. This tendency requires interventions that both mandate accessibility standards and enable the private sector to meet those requirements.

There are significant continuities in the literature, which over time and in different countries, consistently concludes that a legislative and regulatory framework is fundamental to achieving an accessible housing stock. Although voluntary supply- and demand-side responses are often advocated, these are not effective in environments where demand cannot be realised due to factors such as industry resistance and lack of capability. Without clear directions and directives, the likelihood of getting sufficient impetus to grow the numbers accessible stock and improve dwelling functionality is low.

Another consistent theme in the research reviewed is that legislative and regulatory measures alone are insufficient, especially where accessible standards are not required of all stock and tenures. That is why some countries implement a suite of complementary, coordinated and extensive interventions that reinforce efforts across sectors. Tucker et al. (2022) recommend a systems approach that uses different leverage points in the system to increase the provision of accessible stock.

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[12] Bedford Consulting Ltd (2022). *Rapid review of knowledge landscape for the LTIB*. Report prepared for Te Tūāpapa Kura Kāinga / Ministry of Housing and Urban Development FINAL-Report_Rapid-Review-for-LTIB-1-3.pdf (hud.govt.nz)

Finally, this review has identified further research and research-based tools that would support efforts to increase and improve accessibility in new-build housing stock. Those are:

- Research, development and demonstration of practical, cost-effective approaches to accessibility, across different housing typologies.
- Development of acceptable solutions. In NZ, acceptable solutions for level entry has been identified as a significant knowledge gap.
- Development of comprehensive and consistent accessibility assessment tools that can be used for major renovations and new-builds.
- Better informed, nuanced understanding of competing priorities and incentives of different stakeholders, and their impacts on achieving housing accessibility.
- Best-practice in engaging diverse groups of users in accessible design and assessments.
- How to include diverse accessibility needs into standards (physical, sensory, cognitive).
- Improving the evidence base on both the demand for and supply of mainstream housing built with accessible design.
- Improving data and research on housing accessibility related to tenure.
- Development of accessible design guides embedded in cultural perspectives and practices.

Appendix A: Core References

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Appendix C: Key findings and themes from the Baseline Review

Six NZ reports spanning 2007-2022 were selected for the baseline review, because they covered a wide range of NZ and international literature relating to housing and/or accessibility.

Each report was read closely and information was extracted on:

- Existing knowledge about housing accessibility.
- Interventions to increase and improve accessibility in the new-build stock.
- Evidence about whether interventions have improved accessibility outcomes.
- Barriers and enablers for achieving accessibility.
- Key references relevant to the current rapid review.

The six reports are described in Appendix Table C.1 below.

Appendix Table C.1: Baseline reports

Reference	Summary
Bedford Consulting Ltd (2022) *Rapid review of knowledge landscape for the LTIB* Report prepared for Te Tūāpapa Kura Kāinga / Ministry of Housing and Urban Development.	This rapid review of NZ published research was an input to the Ministry of Housing and Urban Development's Long-Term Insights Briefing (LTIB) on the implications of our ageing population for our housing and urban development futures over the next 20-30 years. Of the 116 references found on dwelling performance, 23.3% (27) included information on accessibility or universal design.
K. Saville-Smith, K. Witten, B. James and S. Opit (2018) *Landscape of Research Relevant to the BBHTC Mission A Report of Research Funding, Outputs and Post-Graduate Work Since 2012* Wellington: BBHTC.	A rapid review of NZ research on housing and the built environment to assist the BBHTC national science challenge to prioritise future research investment. The report concluded that there is a dearth of NZ housing accessibility research. Of the 7 references found on accessibility, four related to transport, two to accessibility of public amenities and infrastructure and only one to housing accessibility.
James, B., Saville-Smith, N., Saville-Smith, K. & Isaacs, N. (2017). *Doing Better in Residential Dwellings: Going Beyond the Code in Energy and Accessibility Performance (Integrated Report LR 0508).* BRANZ, Wellington: Judgeford.	This literature review explores whether research-based solutions for 'beyond code' dwelling performance have been incorporated into or exceeded by the building code minimums. It considers whether research-based solutions have been recognised and promoted by the building industry or demanded by consumers in new residential builds or renovations. The determinants of take-up or non-take-up are identified. The research reviewed 16 NZ and international research papers published from 2013 about the dynamics of building industry take-up of innovation and available product, materials and design solutions.
Saville-Smith K. & Saville, J. (2012). *Getting Accessible Housing: Practical Approaches to Encourage Industry Take-up and Meeting Need*. Report prepared for the Office for Disability Issues and Building House Group, Ministry of Business Innovation and Employment: Wellington, NZ.	This report scopes the different levers used to improve the supply of housing with accessible features and assesses the efficacy of those levers. A literature review was conducted, along with interviews with key researchers and practitioners in Australia, the United Kingdom and North America. No significant building technology barriers to increasing the accessibility of housing stock were identified. It was concluded that regulatory and policy interventions, including incentives are needed. Interventions should be tailored to institutional, cultural and market conditions and target all stages of chains of supply and demand.

Saville-Smith, K., James, B., Fraser, R., Ryan, B., & Travaglia, S. (2007). *Housing and Disability: Future proofing New Zealand's Housing Stock for an Inclusive Society [final report]*. Centre for Housing Research (CHRANZ) 10.13140/RG.2.1.1903.9122.	The research focuses on: the housing experiences of physically disabled people, both young and old; the capacity of the housing market to respond to the rising demand for 'lifetime homes'; and opportunities to establish a housing stock that is future-proofed for those affected by moderate to severe physical disability and ageing. Surveying and focus groups found that the housing stock did not meet disabled people's needs.
Scotts, M., Saville-Smith, K. & James, B. (2007). *International trends in accessible housing for people with disabilities: A selected review of policies and programmes in Europe, North America, United Kingdom, Japan and Australia Working Paper 2*. Prepared for The Centre for Housing Research Aotearoa.	This policy and programme review identifies trends in international best practice around accessible housing. It identifies incentives for investing in a housing stock that is responsive to the needs of disabled people. It found that most accessibility standards require relatively low levels of accessibility falling into the 'negotiable' or 'visitable' categories. Furthermore, most design requirements relate to physical rather than sensory impairment.

Findings from those reports were collated to provide a knowledge base for the rapid review about the types of interventions used internationally to increase and improve accessibility in the new-build housing stock.

Interventions

A wide range of interventions are evident internationally, spanning building legislation and regulations, accreditation, policies and strategies, planning interventions, financial incentives and professional development and support for the building industry. A mix of statutory and non-statutory levers to increase housing accessibility is apparent, as is coordination across sectors and action at both central and local government levels.

Examples of mandatory accessibility standards for new-builds are found in Japan, the United Kingdom, some states in the United States of America, and a number of European countries. In some European jurisdictions, housing accessibility is part of a national strategy and cross-sectoral adoption of universal design (e.g., Norway).

As well as evidence of central government initiatives to increase housing accessibility, there are local government / municipality examples of the use of planning tools such as inclusionary zoning and rules requiring new homes and substantial refurbishments to be built to accessible standards (e.g., Greater London Authority).

Increasing professional capacity and capability is evident in various initiatives such as education and training programmes, design guides, good practice resources, awards and competitions. Some countries use voluntary accreditation programmes that certify residential buildings as achieving accessibility standards (such as visitability or full wheelchair accessibility). Examples include Australia, Canada, the United Kingdom, Japan, and NZ (Lifemark).

Although financial incentives are less common than regulation, a few financial incentives provided by government housing finance institutions were found (Scotts et al., 2007). These include in Japan the provision of subsidised home loan assistance for universal design and barrier-free dwellings, and in Norway the provision of loan assistance to increase the number of dwellings built to accessible standards. The Canadian Mortgage and Housing Corporation has provided lower cost home loans to builders of accessible housing.

Evidence of increased or improved accessibility in the housing stock

There is mixed evidence on the efficacy of interventions, even where accessibility is mandatory. Reasons include poor enforcement of mandatory standards, restriction of mandatory requirements to certain housing typologies, and a dominant focus on accessibility needs relating to physical disability (Scotts et al., 2007).

There is evidence of improved accessibility and functionality due to the installation of accessible features although most evidence is from home modifications literature. This is understandable, given that home modifications programmes have dominated interventions to improve housing accessibility. Evidence of modifications efficacy shows reduction in falls and injury costs, reduction in home-based support services costs and delay in the need for institutional care (James et al., 2017). In Japan, government-provided home loan assistance was found to be effective in increasing accessible new-build stock (Scotts et al., 2007).

Internationally, the inclusion of accessible design in new-builds has been shown to have similar benefits to modification of existing dwellings, with the additional benefits of reducing the need for and public costs of home modifications over time. Data collected by Lifemark in NZ shows yearly increases in certificated accessible stock (James et al., 2017).

Scott et al.'s (2007) selected review of policies and programmes in Europe, North America, United Kingdom, Japan and Australia found the most successful ways of encouraging accessible standards in new-builds were building regulations that were strongly enforced, and financial and planning incentives for private sector housing developers. It was found that the countries most successful in engaging private sector developers in creating accessibility in mainstream housing were Japan, USA and Norway. The least successful interventions were voluntary guidelines, branding of universal design for marketing purposes and information campaigns. The latter two approaches aim to increase demand, however they appear to be successful when combined with incentives, regulation and industry capacity building.

James et al. (2017) also concluded that a multi-pronged strategy was effective. Legislation and regulation are necessary to effect change, while voluntary accreditation, informational levers and incentives are important for increasing knowledge and take-up. However, non-mandatory approaches are insufficient and often ineffective on their own. Whatever the mix of instruments, they should be customised to the jurisdiction's specific institutional, market, social and cultural characteristics.

Barriers and enablers to achieving accessibility

Common barriers and enablers to achieving housing accessibility were identified across the reports. Those are presented in Appendix Table C.2.

Appendix Table C.2: Baseline review – barriers and enablers

	Barriers	Enablers
Legislation and regulation	• Lack of legislation and regulation requiring accessibility standards in residential buildings. • Inadequate coverage, e.g., limited to certain housing typologies or government-funded housing. • Inconsistent, contradictory or hard-to-interpret regulation. • Poorly monitored and enforced regulations.	• Broad application of regulatory requirements across different housing typologies. • Clear regulatory requirements. • The cost of regulatory compliance is low. • There is strong monitoring and enforcement.
Government (central, local)	• Lack of leadership, political will. • Underinvestment in housing accessibility research.	• Leadership. • Housing accessibility is one component of a wider strategy of accessibility. • Use of investment, subsidies, taxation and other economic and market-based instruments. • Use of planning levers and rules to incentivise accessibility in residential developments. • Improved co-ordination between agencies, and between public and private sectors. • Procurement to ensure publicly-funded housing is accessible. • Research investment into housing accessibility to demonstrate efficacy and impact.
Industry	• Resistance, inertia to change. • Assumption that universal design is only for older people or disabled, not for mainstream. • Premium pricing of accessibility features. • Lack of responsiveness to consumer demand. • Claims of accessibility/age-friendliness with no verification or where the product only meets minimum standards. • Capability and capacity constraints. • Lack of information on costs of accessible features. • Lack of acceptable solutions.	• Accessible design can be easily and inexpensively incorporated into existing labour processes and cost structures. • Accessibility features have minimal impact on consent requirements. • There are planning incentives for housing developers. • Capacity building through professional development and industry training. • Demonstration projects. • Accreditation. • Clear value cases around the rewards and benefits of take-up and demonstration of practicality. • Acceptable solutions.
Consumers	• Consumer resistance and stigma. • Lack of information on costs of accessible features.	• Strategies to address financial barriers for consumers, such as access to low-cost loans. • Consumer education and information including value cases around the rewards and benefits of take-up and demonstration of practicality.

Appendix D: Key findings and themes from the expert workshop

The purpose of the workshop was to bring together a range of experts in research, policy and practice to engage with the findings of the rapid review.

Eleven people attended the workshop. Their areas of expertise are: policy (housing, building regulation and standards, accessibility, homelessness, older people), housing research (dwelling performance, statistics, cost-benefit analysis), and practice (architecture, accessible/universal design, accessibility standards and accreditation, housing provision).

The workshop started with a PowerPoint presentation of rapid review findings. Then participants were divided into three groups. They were asked to reflect on the findings and comment on the following:

- The range and types of interventions identified in the rapid review. Is there anything that is surprising in these findings?
- How can we increase housing accessibility? Are any of these interventions applicable to NZ?
- What information do you / your organisation need about housing accessibility?

The range of insights are reported below. Individual contributions of workshop participants are not attributed.

The interventions

Participants were familiar with the findings, which broadly confirmed what they knew from their research and practice. There was a common view that the housing stock should address the needs of both population ageing and the increasing prevalence of disability.

One person working in the area of dwelling condition and energy performance has found similar issues in encouraging energy efficiency and heightened thermal performance in housing, including low take-up of accreditation, guidance and other tools.

The only finding that was somewhat surprising was that little attention is paid to the needs of home-based carers in the design and implementation of accessibility. One participant noted that people of all ages can need home-based care, either temporarily or on-going, and this should be taken account of in accessible design.

How can we increase housing accessibility?

A range of ways of increasing housing accessibility were suggested, many of which echo the rapid review findings. There was acknowledgement that most new housing is built by the private market, and therefore interventions need to focus on both requiring and encouraging the private sector to take-up accessible design. Legislating accessible standards in housing was seen as necessary, but there also need to be incentives.

Suggested interventions include:

- Legislation and regulation.
- Standardisation of accessibility requirements across councils.
- Establish a national body mandated to promote accessibility and initiate a national dialogue.
- Professional education and training.

- Certification.
- Advocacy and public campaigns promoting accessibility.
- Bring together interested parties, including people with disabilities, older people, building industry, government agencies.
- Provide information on the actual costs of different accessibility designs and products.
- Modular solutions for accessible features.

Comments included:

> *We know there's a lack of regulation, the building code is not good enough, minimum standard is not good enough.*
>
> *There's an all or nothing perspective. Either you have to have full wheelchair accessibility across the board or nothing. Small modifications benefit everyone. You could do lever handle door handles, align switches, colour contrasting light plates. [These] can be included in all builds, even if they don't meet full accessibility standards.*
>
> *Stigma and perception are a barrier so reframe accessibility in a positive way.*
>
> *Establishment of a professional body, for example, the Rick Hansen Foundation in Canada run an accessibility programme, go out and talk to schools etc.*
>
> *Having a consistent understanding and narrative. What does it [accessibility] mean? What does it look like? Consistent messaging – it can be done, it's not too hard.*
>
> *A really fundamental, good first step is to start thinking as a nation about accessibility. It's really important to have a national conversation.*
>
> *With the Australian example, they started with a national dialogue and developed from there … the government were on the same page as the disability community, the ageing community, the building community. They were all at the same table having a conversation with each other. Here, that dialogue has not started yet.*
>
> *We need to get these issues into the dialogue so it's not just building faster, it's building better … Some of the disabled people we've consulted with want to move away from disability labels to broader community messaging around accessibility.*
>
> *Education is really important – building industry and consumers. Educating people so they know that these options exist, it's doable, it doesn't have to cost more, so you can have a discussion with your builder when they tell you no. Know what to ask for.*
>
> *The able-bodied often don't have to think about it – public education campaign. It benefits everyone. I have wider doors and my Dad loves it, he thinks it's the easiest thing to move furniture. Moving mattresses, you're not having to manoeuvre around corners, just put it on a trolley and wheel it through.*
>
> *It's absurd in a country of 5 million you can have a different definition of level entry in different councils.*
>
> *What's easy for developers, they'll go with easy. They like easy.*

What information is needed about housing accessibility?

Participants identified three areas of information that they considered would help to increase housing accessibility:

- Cost-benefit analysis of accessibility. It was noted that there are studies of the costs and benefits of home modifications, and fewer studies of accessibility in new-builds. A need for updated data was identified.
- Establish the nature and extent of accessibility in the housing stock, including the shortfall of accessible housing stock.
- Evidence of demand for accessibility.

Comments included:

> *When talking about health costs, we don't take into account the ongoing costs, the cost to health. It's much cheaper to factor in at the design and build stage than to try and retrofit. Some houses can't be retrofitted.*
>
> *If we can demonstrate a demand for that sort of information we can start embedding it with government.*
>
> *What are the ongoing costs? You can't have caregivers in your home, can't walk up the steps. We need to look at the costs and who's bearing them.*
>
> *Information on cost – actually having the proper stats on costs. What does it cost to build vs. retrofit? … Some data, but it's out of date now. Just need someone to invest in the research.*

Appendix E: Case study: Australia - Moving from voluntary standards to regulation

Twelve of the core references document the shift in Australia from voluntary standards to a regulatory model requiring basic accessibility standards in new builds (Callaway and Tregloan, 2018; Galbraith, 2018; Larkin et al., 2015; Liebermann, 2013; Ward, 2013; Ward and Bringolf, 2018; Ward and Bringolf, 2022; Ward and Jacobs, 2016; Ward and Franz, 2015; Ward et al., 2014; Wiesel, 2020; Wiesel and Habibis, 2015). This set of references constitutes a significant case study of major interventions to increase and improve accessibility in new-build housing stock. It also shows on-going evaluation of interventions and impacts.

In 2008 Australia ratified The Convention on the Rights of Persons with Disabilities (UNCRPD) which requires signatories to ensure that people with disabilities can access all physical and social spaces (Article 2) and exercise choice in where, and with whom they live (Article 19).

In 2009 The National Dialogue on Universal Housing Design agreed to establish a national guideline and strategic plan to increase accessibility in new build housing and meet their commitments to the UNCRPD. This was followed in 2010 by the Livable Housing Design agreement, a voluntary, industry-led strategy with an aspirational target of all new housing to provide minimum access features by 2020. In the same year the Council of Australian Governments (COAG) endorsed the agreement in the National Disability Strategy (2010-2020). The Australian Government pledged $1 million over four years for the implementation of the strategy.

Associated with the agreement, Livable Housing Design (LHD) guidelines were developed together by disability advocacy groups and the industry. These established minimum accessibility standards. Liveable Housing Australia (LHA), a not-for-profit organisation, was established in 2011 to champion the guidelines, provide training and education to the industry and guide implementation.

Criticism emerged from the disability sector, ageing and community groups and experts that voluntary measures were not enough to ensure provision. They advocated for governments to take an active leadership role. They were sceptical about the effectiveness of voluntary guidelines and strategies, arguing that these had previously been tried in Australia with limited outcomes. Some commentators suggested that significant increase in demand and market profitability would be necessary for builders to change their practices voluntarily but demand was unlikely to be realised as those most in need of accessible housing were less likely to build or buy. Furthermore, it was considered that profit to be made from the home modification market acted as a disincentive to include accessible features from the outset in new-builds.

In contrast, industry supported the voluntary agreement, arguing that the demand for accessibility was too low to justify mandatory standards, and there were implementation costs. Furthermore, a voluntary approach allowed them time to adjust their practices. Some industry professionals expressed the opinion that the accessibility needs of disabled and older people were catered for by social housing and therefore there was little need for accessibility to be mandated for mainstream stock. Despite those industry perspectives,

there was also evidence that the housing industry was already providing LHD features that were viewed as ‘aspirational’ (e.g., wider driveways, bigger bathrooms) to the higher end of the market (Ward and Franz, 2015).

In response to resistance and intensive lobbying from the building industry the Australian government opted to progressively introduce measures for residential accessibility in order to give the industry time to adapt and to measure progress through an ongoing review process (Ward and Bringolf 2018).

Within three years of the implementation of the agreement, it was evident that less than 5% of the 2020 target would be met. LHA estimates that, to December 2014, only around 9,300 projects were built or planned to Silver Level standard (the lowest accessibility standard) or above (Ward and Fox, 2016).

The demonstrable failure of the LHD Agreement gave advocacy groups the necessary evidence to petition the government to implement mandatory requirements. These were eventually achieved through sustained advocacy and pressure on government bodies to meet their commitments under the disability rights framework.

In 2014 a Productivity Commission Report into the Building Codes Board recommended government intervention as accessibility was otherwise ‘unlikely’ to be delivered by the market (Ward and Fox, 2016). In 2016 The Australian Network for Universal Housing Design (ANUHD) and Rights and Inclusion Australia (RIA) recommended Standards Australia review AS4299-1995, to meet accessibility commitments. This was supported by professional peak organisations, community and human rights groups and the Disability and Aged Commissioner, but not by the peak housing bodies who had signed the Agreement. Instead, there was sustained lobbying by the building industry, wishing to retain a voluntary approach. Standards Australia indicated they were unable to move forward with the request (Ward and Fox, 2016, Ward and Bringolf, 2018).

Subsequently, ANUHD requested the Australian Building Codes Board (ABCB) include ‘an agreed access level for all new housing’ to support meeting the 2020 target and embarked upon a campaign petitioning State and Territory Governments to take measures to respond to industry failure and uphold their commitment to the Strategy (Ward and Bringolf, 2018). In concert, The Disability and Aged Commissioner called on COAG to meet the needs of the older population by mandating minimum standards in their review of the National Disability Strategy (2010-2020). In 2017 COAG charged the ABCB to conduct a national Regulatory Impact Assessment into residential accessibility and review LHD silver and gold levels as potential minimum accessibility standards.

As part of compiling evidence about the implications of moving from voluntary to mandatory standards, in 2021 an audit of the 20 most popular house designs produced by Australia’s most active volume builders was done (Winkler et al., 2021). It found that many LHD features were already included in those designs, although inconsistently. All the designs had at least four elements that complied with either the Gold or Platinum Levels (the highest levels of accessibility), however no plan in the study featured all of the LHD elements, and none met the full criteria for any of the options proposed in the ABCB Options Paper. This audit suggests some accessibility costs are already accounted for in new-builds, indicating that a mandatory requirement would not be a significant imposition on volume home builders.

In 2022 a minimum access standard for housing was incorporated into the National Construction Code: level entry, wider doorways and hallways, more space and wall reinforcing in bathroom and toilet to enable future installation of grabrails. Each state and territory determines whether and how the new provisions will be applied in the Building Code in their jurisdiction, a proviso which undermines the intention to produce a consistent standard of housing nationally through the National Construction Code and reduce regulatory confusion for the building industry.

The mandated standards are not yet fully implemented. There has been a varied response to the accessibility requirements. They are supported by five States and Territories (Victoria, Queensland, Tasmania, Australian Capital Territory and Northern Territory) which have aligned implementation of the new provisions (Ward and Bringolf, 2022).

Appendix F: Tables

Appendix Table F.3: Interventions to increase housing accessibility

Intervention	Number of references	References
Legislative and policy interventions	34	Aimers et al., (2021), Bowley and Sinclair (2018), Bringolf (2011), Callaway and Tregloan (2018), Crowe et al., (2024), Denizou (2016), Douglas et al., (2023), Galbraith (2018), Hall (2015), Larkin et al., (2015), Liebermann (2013), Lund and Bringa (2016), Madhavan et al., (2021), McGill et al., (2019), Mosca and Capolongo (2018), NZIER (2017), Park (2014), Plouin et al., (2021), Sarkodee and Martel (2018), Shahrom and Zainol (2015), Stewart (2021), The Centre for International Economics (2021), Tucker et al., (2022), Ward (2013), Ward and Bringolf (2018), Ward and Bringolf (2022), Ward and Franz (2015), Ward and Jacobs (2016), Ward et al., (2014), Wiesel (2020), Wiesel and Habibis (2015), Wiesel et al., (2015), Winkler et al., (2021), World Health Organization (2021)
Accessible design guidance and information provision	34	Aimers et al., (2021), Bowley and Sinclair (2018), Bringolf (2011), Callaway and Tregloan (2018), Callaway et al., (2020), Crowe et al., (2024), Denizou (2016), Galbraith (2018), Hall (2015), James (2019), Larkin et al., (2015), Liebermann (2013), Lindsay et al., (2024), Park (2014), Pierce et al., (2015), Plouin et al., (2021), Rooney et al., (2016), Sarkodee and Martel (2018), Shahrom and Zainol (2015), Sinclair et al., (2020), Štaube et al., (2016), Stewart (2021), The Centre for International Economics (2021), Valderrama-Ulloa et al., (2024), Ward (2013), Ward and Bringolf (2018), Ward and Bringolf (2022), Ward and Franz (2015), Ward and Jacobs (2016), Ward et al., (2014), Wiesel and Habibis (2015), Wiesel et al., (2015), Wilkinson et al., (2018), World Health Organization (2021)
Accreditation	27	Aimers et al., (2021), Bringolf (2011), Callaway and Tregloan (2018), Crowe et al., (2024), Galbraith (2018), Larkin et al., (2015), Liebermann (2013), Lindsay et al., (2024), Rooney et al., (2018), Rooney et al., (2016), Sarkodee and Martel (2018), Saville-Smith et al., (2016), Shahrom and Zainol (2015), Sinclair et al., (2020), Stewart (2021), The Centre for International Economics (2021), Ward (2013), Ward and Bringolf (2018), Ward and Bringolf (2022), Ward and Franz (2015), Ward and Jacobs (2016), Ward et al., (2014), Wiesel and Habibis (2015), Wiesel et al., (2015), Wilkinson et al., (2018), Winkler et al., (2021), World Health Organization (2021)
Funding and financial incentives	19	Aimers et al., (2021), Bringolf (2011), Callaway and Tregloan (2018), Callaway et al., (2020), Crowe et al., (2024), DesignABLE Inc. (2020), Douglas et al., (2023), Hall (2015), Lindsay et al., (2024), Madhavan et al., (2021), Sarkodee and Martel (2018), The Centre for International Economics (2021), Ward (2013), Ward and Franz (2015), Ward and Jacobs (2016), Wiesel and Habibis (2015), Wiesel et al., (2015), Wilkinson et al., (2018), World Health Organization (2021)
Planning rules and incentives	15	Bowley and Sinclair (2018), Bringolf (2011), Hall (2015), Larkin et al., (2015), Liebermann (2013), Lindsay et al., (2024), Lund and Bringa (2016), McGill et al., (2019), Park (2014), Sinclair et al., (2020), Tucker et al., (2022), Ward (2013), Ward and Franz (2015), Ward and Jacobs (2016), World Health Organization (2021)
Public promotion	12	Bowley and Sinclair (2018), Denizou (2016), James and Saville-Smith (2019), Liebermann (2013), Park (2014), Plouin et al., (2021), Saville-Smith et al., (2016), Stewart (2021), Ward (2013), Ward and Bringolf (2022), Ward and Franz (2015), Wiesel and Habibis (2015)

Professional education and training	12	Bringolf (2011), Busby and Harrison, (2018), Crowe et al., (2024), James (2024), Larkin et al., (2015), Lindsay et al., (2024), McGill et al., (2019), Plouin et al., (2021), Rooney et al., (2016), Tucker et al., (2022), Ward and Franz (2015), Wilkinson et al., (2018)
Accessibility assessment tools	11	Aimers et al., (2021), James and Saville-Smith (2019), Lakhani et al., (2019), Mosca and Capolongo (2018), Plouin et al., (2021), Rooney et al., (2016), Rooney et al., (2018), Sarkodee and Martel (2018), Valderrama-Ulloa et al., (2023), Valderrama-Ulloa et al., (2023), Wilkinson et al., (2018)
Government procurement	5	DesignABLE Inc. (2020), Hall (2015), Liebermann (2013), Saville-Smith et al., (2016), Stewart (2021)

Appendix Table F.4: Enablers

Enabler	Number of references	References
Accessibility principles and standards in building legislation and regulations	29	Bringolf (2011), Bowley and Sinclair (2018),Callaway and Tregloan (2018), Callaway et al., (2020), Denizou (2016), DesignABLE Inc. (2020), Galbraith (2018), Hall (2015), James (2024), Larkin et al., (2015), Liebermann (2013), Lindsay et al., 2024; Lund and Bringa (2016), McGill et al., (2019), NZIER, (2017), Plouin et al., (2021), Shahrom and Zainol (2015), Štaube et al., (2016), Stewart (2021), Tucker et al., (2022), Ward et al., (2014), Ward (2013), Ward and Bringolf (2022), Ward and Bringolf (2018), Ward and Franz (2015), Wiesel (2020), Wiesel and Habibis (2015), Wiesel et al., (2015), World Health Organization (2021)
Professional development and training	17	Aimers et al., (2021), Bringolf (2011), Busby and Harrison (2018), Callaway and Tregloan (2018), Crowe et al., (2024), Denizou, (2016), James (2024), Lakhani et al., (2019), Lund and Bringa (2016), Park, (2014), Plouin et al., (2021), Rooney et al., (2016), Rooney et al., (2018), Shahrom and Zainol (2015), Tucker et al., (2022), Ward (2013), Wilkinson et al., (2018)
Funding, financial incentives for construction	15	Aimers et al., (2021), Bringolf (2011), Crowe et al., (2024), Douglas et al., (2023), James (2024), Lindsay et al., (2024), Lund and Bringa (2016), Sarkodee and Martel, (2018), Štaube et al., (2016), Stewart (2021), Ward (2013), Ward and Franz (2015), Wiesel and Habibis (2015), Wiesel et al., (2015), World Health Organization (2021)
Public promotion campaigns	14	Bringolf (2011), Callaway and Tregloan (2018), Galbraith (2018), Hall (2015), James (2024), Lakhani et al., (2019), Lindsay et al., (2024), Plouin et al., (2021), Tucker et al., (2022), Shahrom and Zainol (2015), Ward (2013), Ward and Bringolf (2018), Wiesel and Habibis (2015), Wiesel et al., (2015)
Information about cost-effective solutions for accessible housing	12	Aimers et al., (2021), Bringolf (2011), Bowley and Sinclair (2018), Crowe et al., (2024), DesignABLE Inc. (2020), Galbraith (2018), James (2024), Lindsay et al., (2024), Madhavan et al., (2021), McGill et al., (2019), Sarkodee and Martel (2018), Ward et al., (2014)
Government leadership	11	Bowley and Sinclair (2018), Crowe et al., (2024), Lund and Bringa (2016), Madhavan et al., (2021), Saville-Smith et al., (2016), Ward and Bringolf (2022), Ward and Jacobs (2016), Ward (2013), Wiesel and Habibis (2015), Wiesel et al., (2015), World Health Organization (2021)

Design guidance, good practice examples, acceptable solutions	11	Bowley and Sinclair (2018), Bringolf (2011), Callaway and Tregloan (2018), Denizou (2016), James (2024), Liebermann (2013), Lund and Bringa (2016), Plouin et al., (2021), Stewart (2021), Ward and Franz (2015), World Health Organization (2021)
End user engagement	11	Aimers et al., (2021), James (2024), Lakhani et al., (2019), Larkin et al., (2015), Lindsay et al., (2024), Madhavan et al., (2021), Rooney et al., (2016), Rooney et al., (2018), Sarkodee and Martel (2018), Wiesel and Habibis (2015), Wiesel et al., (2015)
Government procurement	10	DesignABLE Inc. (2020), James (2024), Plouin et al., (2021), Sarkodee and Martel (2018), Saville-Smith et al., (2016), Stewart (2021), Tucker et al., (2022), Ward (2013), Ward and Franz (2015), Wiesel & Habibis (2015)
Improve data on accessibility in housing stock	9	Aimers et al., (2021), Callaway and Tregloan (2018), Callaway et al., (2020), Crowe et al., (2024), Lindsay et al., (2024), McGill et al., (2019), Madhavan et al., (2021), Stewart (2021), Wiesel et al., (2015)
Demonstration projects	8	Bringolf (2011), DesignABLE Inc. (2020), Callaway and Tregloan (2018), Liebermann (2013), Plouin et al., (2021), Stewart (2021), Ward (2013), Ward and Franz (2015)
Assessment tools	7	Mosca and Capolongo (2018), Lakhani et al., (2019), Rooney et al., (2016) Rooney et al., (2018), Sarkodee and Martel (2018), Ward and Jacobs (2016), Wilkinson et al., (2018)
Planning incentives	7	Bringolf (2011), James (2024), Liebermann, (2013), Lund and Bringa (2016), Sinclair et al., (2020), Ward (2013), Wiesel and Habibis (2015)
Accessible housing register	7	Aimers et al., (2021), Crowe et al., (2024), Callaway et al., (2020), Lindsay et al., (2024), Stewart (2021), Wiesel et al., (2015), Wiesel and Habibis (2015)
Accessible design advisory panel	7	DesignABLE Inc. (2020), James (2024), Lakhani et al., (2019), Larkin et al., (2015), Lindsay et al., (2024), Rooney et al., (2016), Rooney et al., (2018)
Enforcement	6	DesignABLE Inc. (2020), Lindsay et al., (2024), NZIER (2017), Rooney et al., (2016), Shahrom and Zainol (2015), World Health Organization (2021)
Policy and strategy	6	Liebermann (2013), Lund and Bringa (2016), McGill et al., (2019), Plouin et al., (2021), Stewart (2021), World Health Organization (2021)
Accreditation	4	Bowley and Sinclair (2018), NZIER (2017), Saville-Smith et al., (2016), Stewart (2021)
Design competitions	3	Bowley and Sinclair (2018), Busby and Harrison (2018), Denizou (2016)
Mainstream accessibility tools and products, pre-fab, modular	3	Bowley and Sinclair (2018), Galbraith (2018), Saville-Smith et al., (2016)

Appendix Table F.5: Barriers

Barrier	Number of references	References
Lack of accessibility principles and standards in legislation and regulation	22	Bringolf (2011), Bowley & Sinclair (2018), Callaway et al., (2020), Callaway and Tregloan (2018), Galbraith (2018), Hall (2015), James (2024), James and Saville-Smith (2019), Larkin et al., (2015), Liebermann (2013), McGill et al., (2019), Stewart (2021), Tucker et al., (2022), Ward (2013), Ward et al., (2014), Ward and Bringolf (2022), Ward and Bringolf (2018), Ward and Jacobs (2016), Ward and Franz (2015), Wiesel (2020), Wiesel et al., (2015), Wiesel and Habibis (2015)
Lack of clear and consistent design specifications	17	Aimers et al., (2021), Bringolf (2011), Crowe et al., (2024), Denizou (2016), Galbraith (2018), Heller et al., (2022), James (2024), James and Saville-Smith (2019), Lakhani et al., (2019), Madhavan et al., (2021), NZIER (2017), Plouin et al., (2021), Rooney et al., (2016), Sarkodee and Martel (2018), Saville-Smith et al., (2016), Ward (2013), World Health Organization (2021)
Lack of industry capacity and capability	17	Bringolf (2011), Busby and Harrison (2018), Crowe et al., (2024), Denizou (2016), James (2024), Lakhani et al., (2019), Larkin et al., (2015), Lindsay et al., (2024), Park (2014), Lund and Bringa (2016), Plouin et al., (2021), Shahrom and Zainol (2015), Tucker et al., (2022), Ward (2013), Ward and Franz (2015), Ward and Jacobs (2016), Wiesel (2020)
Lack of funding and financial incentives for construction	17	Aimers et al., (2021), Callaway et al., (2020), Douglas et al., (2023), James (2024), James (2019), Lakhani et al., (2019), Lindsay et al., (2024), Madhavan et al., (2021), Sarkodee & Martel (2018), Ward (2013), Ward and Bringolf (2018), Ward and Franz (2015), Ward and Jacobs (2016), Wiesel and Habibis (2015), Wiesel et al., (2015), Wilkinson et al., (2018), World Health Organization (2021)
Lack of accessibility principles and standards in policy	16	Bringolf (2011), Galbraith (2018), Hall (2015), James (2024), James and Saville-Smith (2019), Larkin et al., (2015) Liebermann (2013), Lindsay et al., (2024), McGill et al., (2019), NZIER (2017), Sinclair et al., (2020), Ward (2013), Ward and Bringolf (2018), Ward and Franz (2015), Ward and Jacobs (2016), Wiesel et al., (2015)
Regulation – minimum requirements and gaps	14	Bringolf (2011), Callaway and Tregloan (2018), Douglas et al., (2023), Hall (2015), Larkin et al., (2015), Liebermann (2013), Plouin et al., (2021), Rooney et al., (2016), Tucker et al., (2022), Ward (2013), Ward and Bringolf (2018), Wiesel and Habibis (2015), Wiesel et al., (2015), World Health Organization (2021)
Industry resistance	14	Bringolf (2011), Callaway and Tregloan (2018), Heller et al., (2022), James (2024), Larkin et al., (2015), Lakhani et al., (2019), Liebermann, (2013), Park (2014), Ward (2013), Ward and Bringolf (2018), Ward and Bringolf (2022), Ward and Franz (2015), Ward and Jacobs (2016), Wiesel (2020)
Misunderstanding about costs of accessible design	14	Bowley and Sinclair (2018), Bringolf (2011), James (2024), James and Saville-Smith (2019), Larkin et al., (2015), Lindsay et al., (2024), Lund and Bringa (2016), McGill et al., (2019), Park (2014), Saville-Smith et al., (2016), Sinclair et al., (2020) Ward (2013), Ward and Bringolf (2018), Ward and Franz (2015)
Planning and consenting impediments	13	Aimers et al., (2021), Bowley and Sinclair (2018), Bringolf (2011), Callaway and Tregloan (2018), Crowe et al., (2024), Galbraith (2018), James (2024), Madhavan et al., (2021), Plouin et al., (2021), Rooney et al., (2016), Sinclair et al., (2020), Wiesel and Habibis (2015), Wiesel et al., (2015)

Focus on specialised housing, rather than mainstream	12	Busby and Harrison (2018), Bringolf (2011), Crowe et al., (2024), James (2024), Lakhani et al., (2019), Liebermann (2013), McGill et al., (2019), Park (2014), Ward (2013), Ward et al., (2014), Ward and Bringolf (2022), Ward and Franz (2015)
Stigma	11	Bringolf (2011), Hall (2015), James (2024), James and Saville-Smith (2019) Liebermann (2013), Lindsay et al., (2024), Tucker et al., (2022), Ward (2013), Ward and Jacobs (2016), Wiesel and Habibis (2015), Wiesel et al., (2015)
Financial constraints on householders	11	Bringolf (2011), Callaway et al., (2020), Galbraith (2018), Lakhani et al., (2019), Liebermann (2013), Plouin et al., (2021), Štaube et al., (2016), Ward (2013), Ward and Bringolf (2018), Wiesel (2020), Wiesel and Habibis (2015)
Lack of understanding of end user requirements	10	Bringolf (2011), James (2024), Lakhani et al., (2019), Lindsay et al,. (2024), Rooney et al., (2016), Rooney et al., (2018), Sarkodee and Martel (2018), Shahrom and Zainol (2015), Ward (2013), Wiesel et al., (2015)
Lack of data, measures and assessment tools	10	Aimers et al., (2021), Crowe et al., (2024), DesignABLE (2020), Madhavan et al., (2021), McGill et al., (2019), Mosca and Capolongo (2018), Plouin et al., (2021), Stewart (2021), Ward and Jacobs (2016) Wiesel et al., (2015)
Low public awareness of benefits	9	Bringolf (2011), Callaway and Tregloan (2018), James (2024), James and Saville-Smith (2019), Sinclair et al., (2020), Štaube et al., (2016), Saville-Smith et al., (2016), Ward and Bringolf (2018), Ward and Franz (2015)
Builders' short-term interests, profit margins	9	Bringolf (2011), James (2024), Lakhani et al., (2019), Sinclair et al., (2020), Tucker et al., (2022), Ward (2013), Ward and Bringolf (2022), Ward and Franz (2015), Ward and Jacobs (2016)
Industry inertia	9	Bowley & Sinclair (2018), Bringolf (2011), Larkin et al., (2015), Lindsay et al., (2024), Ward (2013), Ward et al., (2014), Ward and Bringolf (2022), Ward and Franz (2015), Ward and Jacobs (2016)
Lack of information about benefits	9	Bowley & Sinclair (2018), Bringolf (2011), James (2024), Lakhani et al., (2019), Larkin et al., (2015), Lindsay et al., (2024), Sarkodee and Martel (2018), Ward (2013), World Health Organization (2021)
Lack of political will	8	Crowe et al., (2024), Heller et al., (2022), Larkin et al., (2015), Sarkodee and Martel (2018), Ward and Bringolf (2018), Ward and Franz (2015), Ward and Jacobs (2016), Wiesel & Habibis (2015)
Lack of cross-sectoral collaboration	8	Bringolf (2011), Crowe et al., (2024), Lakhani et al., (2019), Larkin et al., (2015), Rooney et al., (2016), Ward (2013), Wiesel et al., (2015), World Health Organization, 2021
Perceived lack of demand	8	Aimers et al., (2021), Larkin et al., (2015), Lindsay et al., (2024), Madhavan et al., (2021), Park (2014), Ward (2013), Ward and Franz (2015), Ward and Jacobs (2016)
Compliance/enforcement staff capacity and capability	8	Bringolf (2011), Callaway et al., (2020), Crowe et al., (2024), McGill et al., (2019), NZIER (2017), Shahrom and Zainol (2015), Ward and Jacobs (2016), World Health Organization (2021)
Lack of accessible housing registers	7	Callaway et al., (2020), Crowe et al., (2024), Lindsay et al., (2024), Madhavan et al., (2021), Plouin et al., (2021), Rooney et al., (2016), Wiesel and Habibis (2015)
Policy uncertainty	6	Aimers et al., (2021), Crowe et al., (2024) Lakhani et al., (2019), Madhavan et al., (2021), Ward (2013), Wiesel and Habibis (2015)

Accessibility only in public housing	6	Bringolf (2011), Crowe et al., (2024), Sinclair et al., (2020), Wiesel and Habibis (2015), Ward and Bringolf (2018), Ward and Franz (2015)
Lack of leadership	6	Aimers et al., (2021), Crowe et al., (2024), Larkin et al., (2015), Madhavan et al., (2021), Ward (2013), Ward and Bringolf (2018), Wiesel and Habibis (2015)
Lack of knowledge of cost-effective solutions	5	Crowe et al., (2024), James (2024), Larkin et al., (2015), Lindsay et al., (2024), Plouin et al., (2021)
Tenure constraints	4	Callaway et al., (2020), Hall (2015), Plouin et al., (2021), Wiesel (2020)
Reliance on home modifications policy	4	Ward (2013), Ward and Bringolf (2022), Ward and Franz (2015), Wiesel (2020)
Lack of cultural accessibility design	4	James (2019), Sarkodee and Martel (2018), Wiesel and Habibis (2015), Wiesel et al., (2015)