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Well Homes Initiative: A Home-Based Intervention to Address Housing-Related Ill Health

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Abstract

Background. Six thousand children are hospitalized each year in New Zealand with housing sensitive conditions, and 86.2% of these children are rehospitalized during childhood. The Healthy Homes Initiative, set up by the Ministry of Health, and implemented in Wellington through Well Homes, carries out housing assessments and delivers a range of housing interventions. *Method.* Housing assessments were carried out by trained community workers. Philanthropic funding was received for the interventions through a local charitable trust. *Results.* Well Homes saw 895 families. Mold in the home was the most commonly recorded area of poor housing quality, in 836 homes (93%). Partial or complete lack of insulation was also common, with 452 records (51%) having a documented need for further assessment and either an upgrade or full installation. Eighty-three percent of homes had insufficient sources of heating. A total of 5,537 interventions were delivered. Bedding, heaters, and draft stopping were delivered over 90% of the time. In contrast, insulation and carpets were only delivered 40% of the time. Interventions were least likely to be delivered in private rental housing. *Discussion.* Targeted interventions using social partnerships can deliver housing improvements for relatively little health spending. Well Homes provides immediate and practical interventions, education, connection with social agencies, and advocacy for more substantial structural home improvements to help families keep their home warmer, drier, and healthier. This approach will be strengthened when combined with a new regulatory framework to raise the standards of private rental housing.

Keywords

environmental health, epidemiology, health disparities, neighborhood, social determinants of health

Many New Zealand houses are cold, damp, and moldy. Poor-quality housing drives ill health, including increased rates of respiratory and cardiovascular diseases and communicable diseases (Baker et al., 2019; Ige et al., 2018; Thomson et al., 2009). Housing-related poor health is a problem of considerable scale in New Zealand, with significant health inequities (Johnson et al., 2018). Private rental houses and public housing are of generally poorer quality than owner-occupied homes (Johnson et al., 2018). With much of the worst quality housing in New Zealand being in the lower end of the private rental market, a variety of solutions are required to improve the multifaceted and interlinked issues of poor housing, and health and socioeconomic inequities. Two possible levers are community-led interventions and regulation to improve housing. This article looks at the strengths and weaknesses of delivering community-based interventions in a poorly regulated housing system.

The private rental market in New Zealand has been very lightly regulated, with little to no obligation on the landlord to ensure a warm, safe, and dry home, and with little choice for tenants on low incomes to rent a healthy home (Bierre et al., 2014). This means that those who are worst-off economically and socially carry the additional burden of poor-quality housing that exacerbates or causes ill health. In some developed countries, there are mechanisms to help ensure a minimum standard of housing, particularly when

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government assistance is being received. Section 8 in the United States provides rent subsidies for low-income housing. Before the Section 8 subsidy is approved, an inspection of the property is done to ensure that it meets minimum standards for health (U.S. Department of Housing and Urban Development, n.d.). In New Zealand, rent assistance for people on low incomes does not require minimum standards for housing quality beyond minimum legislative requirements (Ministry of Social Development, 2017). This omission is despite New Zealand having universal publicly funded health care, which would benefit from a systems approach to improving health.

In this article, we look at "Well Homes," an intervention program aimed at improving the home environment for people who have been hospitalized with health conditions attributable to housing (Chisholm et al., 2019). The program addresses modifiable risk factors in the home environment, through facilitating structural housing interventions, connecting clients to social services, and relocating clients into public housing (Chisholm et al., 2019). Well Homes is a community-based partnership approach between two nongovernmental organizations (a Māori-based [indigenous] organization and a private sustainability trust), regional health providers, and researchers. This partnership brings together community work experience, home performance expertise, nursing and health care skills, and research competencies. Clients of Well Homes are low-income families with children who have been hospitalized for health conditions attributable to the home environment.

Housing-related illness and health inequities require approaches that address structural and socioeconomic determinants of health (Israel et al., 2005). Community-based participatory research is a collaborative approach that builds on existing knowledge in communities and works to strengthen community resources to enable durable improvements in health systems (Howden-Chapman et al., 2011; Israel et al., 2005). Researchers work as partners with community, and with shared aims and aspirations. The intervention program we discuss in this article is an example of a partnership between community and researchers, in which research and the intervention program work alongside each other iteratively. In Well Homes, the research team provides advice on data collection and health risks to the community partners, while the community partners provide researchers with insights into the interactions between housing, health, and the provided interventions. Data gathered by the community partners are vital to the research team, while the qualitative and quantitative evaluations provided by the research team support the community partners' advocacy work. This type of approach leads to new understandings about how to best implement solutions in the home environment to improve the health of vulnerable populations.

The Well Homes intervention is holistic in that it aims to address housing quality by connecting clients with a broad range of interventions known from other studies to improve—either directly or indirectly—housing quality. However, Well Homes differs from other housing intervention studies—in which participants move to superior housing or a particular modification is made to a large sample of housing (Ige et al., 2018; Thomson et al., 2009)—as it does not have any way of ensuring recommended interventions are delivered. Therefore, understanding what interventions are delivered, and to what population, is crucial to analyzing its effectiveness. In this article, we assess the demographic characteristics of the study population, housing needs as identified by participants and assessors, and what interventions were delivered.

Method

Description of the Well Homes Intervention

Entry Into Well Homes. Participants can be referred to Well Homes by hospitals, general practitioners, and community health providers. The initial eligibility criteria at the start of the program in 2015 targeted families on low incomes with children, who had previously been hospitalized with specified housing-related indicator conditions or were otherwise identified as at risk of rheumatic fever. The program had been expanded by early 2017 to incorporate a broader range of risk factors. There were three target populations at the end of 2018: families with a child aged 0 to 14 years hospitalized with a housing-related indicator condition; families with a child aged 0 to 5 years, for whom at least two social investment risk factors[1] apply; and pregnant women or women with a newborn baby (Ministry of Health, 2019). The list of housing-related indicator conditions used is based on a Ministry of Health list, drawn from a wider set used by researchers, to identify the subgroup of hospitalizations attributable (at least in part) to the home environment, and which could likely be avoided had people had access to high quality and safe housing. Participating families must have a low income.

Housing Assessments. Trained community workers carry out housing assessments, using a Housing Concerns Survey developed in partnership with researchers, to identify areas of housing need. The assessor also collects information about the family's perception of their home, bedroom occupancy, heating sources, and energy hardship. All housing assessments include information for families on how best to keep their home warm, dry, and safe, based on the appraisal of the condition of their houses and their heating and ventilation practices.

Operational Aspects of the Well Homes Service. The Ministry of Health funds the central management and housing assessment service of Well Homes. Philanthropic funding from a local trust funds some key interventions, such as

heaters and beds. Preexisting government-funded subsidy schemes partially fund more substantial capital investment, such as insulation, while other interventions that are delivered to families are supplied either free of charge or at a discounted rate by partnerships with collaborating organizations and businesses. These interventions include the supply of bedding and curtains from local bedding and curtain banks, draught stoppers, and firewood from local prison program, and referrals onto other government (e.g., social welfare) and nongovernment (e.g., budgeting, law advice) services for further assessment and support. Well Homes clients living in government-owned public housing can expect to have "capital interventions" (insulation, ventilation, minor repairs, heating, curtains) delivered within 90 days, while for clients living in private rentals, owner-occupied, or community housing, the process will usually involve connection with other services or subsidy schemes or tenant advocacy to the landlord.

Evaluation Study Data and Processes

Ethics. The study was approved by the New Zealand Health and Disability Ethics Committee 15/STH/138.

Study Population. Households were included if they had been enrolled in Well Homes after May 1, 2015; were seen by an assessor; and had at least one intervention recorded. We excluded any clients enrolled within 6 months of the date of the database extract being used, in order to restrict analysis to those where there had been sufficient time for the delivery of necessary interventions. This selection resulted in 895 referrals over a 30-month period up until June 2018. The demographic information presented is for the primary client, which is normally the child previously hospitalized with a housing-related condition or meeting other eligibility criteria (Table 1).

Analysis

We present tables for demographics, housing situation, and interventions. For the interventions identified as needed, we note if any actions were taken and if they were successfully delivered. The rate of success for the different tenure types is noted.

Demographics

- *Age*: The age at the initial point of engagement with the service was categorized into four age groups: <5, 5 to 14, 15 to 29, >29 years old.
- *Ethnicity*: Patient ethnicity has been categorized using self-reported ethnicity (Health Information Standards Organisation, 2017). Individuals in the study population were identified as Māori (the indigenous population of New Zealand), Pacific, Asian, European, or Other.

Housing Situation

- *Tenure*: Tenure type is categorized into owner-occupied, private rental, public housing (central government), or "Other" (community housing, temporary accommodation).
- *Bedrooms*: The number of bedrooms as recorded in the housing assessment of room type.
- *Occupants' perceptions of housing conditions*: Household members were asked for their impression of housing conditions with five "Yes/No" questions designed to assess exposure to cold housing and poor indoor air quality.

1. Is your home usually colder than you would like?
2. During the winter months, was your house so cold that you shivered inside?
3. Does your home smell moldy or musty?
4. Is there mold on the walls in bedrooms or living areas of your home?
5. Are there damp walls in the bedrooms or living areas of your home?

- *Identified need around housing quality*: Each referral has been classified as needing assistance around seven key areas that relate to cold housing, indoor air quality, or lack of suitable bedding arrangements. This information was sourced primarily from the initial housing assessment records, which details areas of identified poor housing quality based on the reports from the qualified housing assessors.
  - *Mold*: Any visible mold on the walls in bedrooms or living areas.
  - *Insulation*: Either ceiling or underfloor insulation required (full install, or upgrade).
  - *Floor coverings*: Floor coverings identified as inadequate.
  - *Curtains*: Curtain measurements taken for any of the bedrooms or living areas.
  - *Heating*: No heating source noted for any of the bedrooms or living areas.
  - *Ventilation*: Inadequate ventilation in bathroom or kitchen, dryer not ducted to the outside, or no ground vapor barrier.
  - *Draught stopping*: Any draughts identified around doors or windows.
  - *Crowding*: Functional or structural crowding identified by assessor, including where the average number of people recorded by assessors as sleeping in a room exceeded two.

Intervention Data

- Interventions assessed for and delivered:
  - *Mold kit*: white vinegar, spray bottle, and cloth
  - *Beds*: bed, bunk and cot sets, mattresses
  - *Bedding*: blankets, sheets, mattress protectors

Table 1. Study Population.

Variable	Number of participants (n = 895)	Proportion of participants (% study total)	New Zealand population
Age			
<5	507	56.6%	6.6%
5-14	205	22.9%	12.9%
15-28	92	10.3	21.0%
>29	90	10.1	60.4%
Unknown	1	0.1	
Sex			
Female	499	55.8	51.8
Male	396	44.2	48.2
Ethnicity[a]			
Māori	393	43.9%	14.9%
Pacific people	286	32.0%	7.2%
Asian	52	5.8%	11.8%
European	108	12.1%	74.0%
Other	56	6.2%	1.2%
Eligibility criteria			
0-5 Hospitalizations	124	13.9%	NA
0-5 Priority population	153	17.1%	NA
Pregnant women and newborns	180	20.1%	NA
Rheumatic fever criteria met	438	48.9%	NA
Tenure			
Owner-occupied	71	7.9%	61.5%
Private rental	362	40.4%	33.2%
Social housing	423	47.3%	5.3%
Other	35	3.9%	0.0%
Unknown	4	0.4%	
Bedrooms			
1	39	4.4%	5.7%
2	125	14.0%	19.1%
3	302	33.7%	44.5%
4+	132	14.7%	30.7%
Unknown	297	33.2%	
Evidence of crowding			
Yes	595	66.5%	5.1%
No	300	33.5%	94.9%

[a]Census ethnicity is self-reported and more than one ethnicity is allowed.

- *Ceiling and/or underfloor insulation*: upgrade or complete new installation
- *Carpets*: supply of carpets to replace existing floor coverings, or provide them in uncarpeted houses
- *Curtains*: made-to-measure floor-length curtains provided through local curtain bank
- *Heating sources*: portable electric heaters, firewood
- *Ventilation*: mechanical ventilation in bathroom and/or kitchen, dryer ducted to outside, ground vapor barrier
- *Draught stopping*: window kit/tape, door snake
- *Minor repairs*: repairs and maintenance for work required to seal the thermal envelope and address safety issues
- *Referral for social housing relocation*: support to find new or alternative social housing accommodation
- *Referral for private/community housing relocation*: support to find new or alternative private/community housing accommodation
- *Health referrals*: information, advice or referrals given about smoking cessation, health management, or disease control
- *Social referrals*: referrals for legal or budgeting advice, social work, or welfare assistance

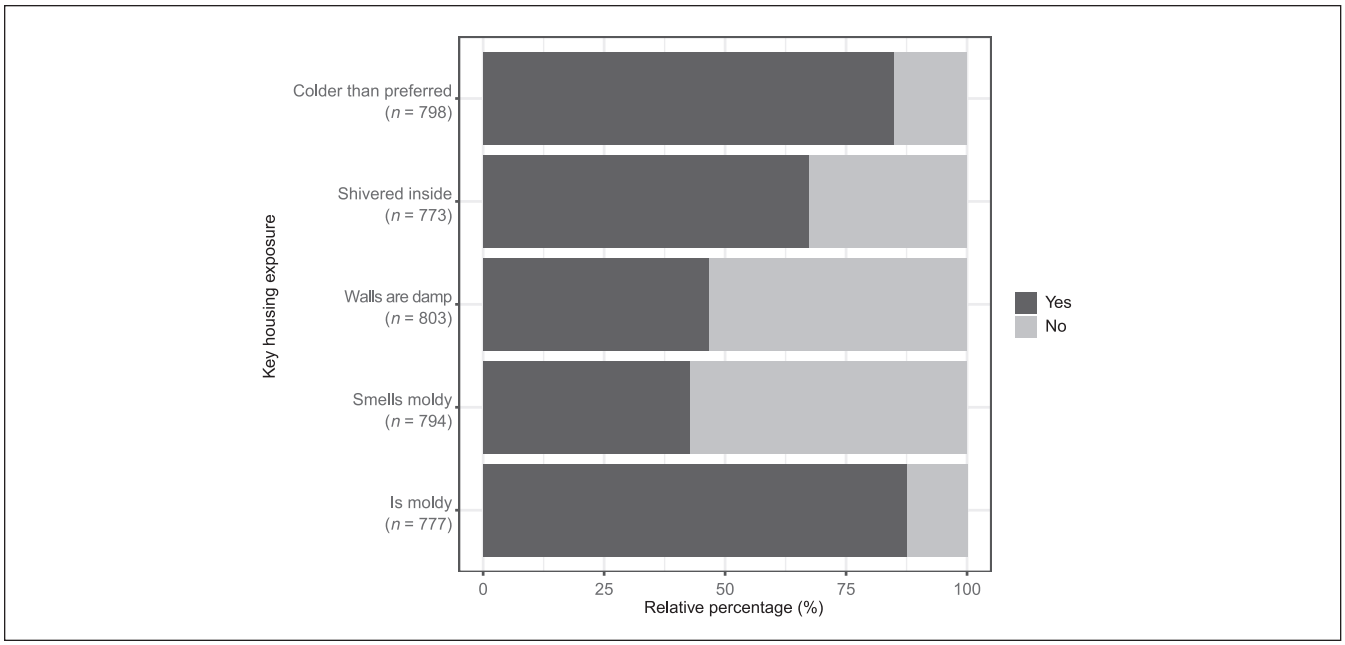

Figure 1. Participants' reports of exposure to cold, damp and mold, and ability to heat the home at the time of assessment.

- *Support with power bills*: energy efficient lightbulbs, emergency grant assistance, information on alternative power companies
- *Injury prevention*: safe-sleeping advice and devices, fire safety

Results

The characteristics of the primary clients and the households they live in are presented in Table 1. The population is young: 72% of all clients in the study population were 0 to 14 years of age, and 70% of these children were younger than 5 years old at the time of the housing assessment. Most of those in the study population identified as either Māori or Pacific (44% and 32%, respectively); less than 15% identified as European. This is in strong contrast to the ethnic population breakdown at the national level; nearly three quarters of the national population identify as European, while Māori and Pacific represent only between 13% and 8% of the population, respectively (Statistics New Zealand, 2013). The majority (63%) of clients were eligible because of the primary client's record of housing-related indicator conditions such as selected respiratory conditions and infectious diseases. Nearly 50% of clients were living in government-owned public housing, while 40% were in private rental households.

At the time of the initial assessment, the majority of clients perceived their house to be cold, damp, and moldy (see Figure 1). Most respondents (85%) said their home was colder than they would like, and 67% said it was so cold during winter that they had shivered inside. Eighty-eight percent reported mold on the walls of bedrooms or living areas. Only 23% of clients felt they could heat their home to the level they would like and only 27% reported they had not had any issues affording their power. Of the 518 that reported struggling at least once in the past year to afford their power, almost one fifth reported struggling at least 7 out of the past 12 months.

Table 2 details the areas of housing need ("Need identified") with regard to cold housing, poor indoor air quality, or lack of suitable bedding arrangements. It also details how often interventions were attempted through the relevant provider ("Action attempted") and the rate at which interventions were delivered.

Mold was identified as a problem in 93% of homes, with inadequate heating and draughts prevalent in 81%. Insufficient ventilation was the next most common issue identified (71.1%). Despite subsidized retrofit insulation programs having been funded for almost 2 decades (Grimes et al., 2016), half of the houses required insulation. These concerns around insulation levels, as well as adequacy of curtains, and bedding supplies were identified in 40% to 50% of homes. The rates of referrals for the various intervention types and the delivery rate in each of these key areas differed substantially.

In 869 out of the 895 households evaluated in this study (97%), at least one of the interventions detailed in Table 2 was delivered. The average number of these interventions that were successfully delivered was 4.7. Mold kits and curtains were actioned in over 9 out of the 10 cases where it was identified as an issue, although curtains had a lower delivery proportion for each of these homes than mold kits (73.2% compared with 99.6%). Insulation had the most consistent drop-off in delivery after the initial housing assessment; nearly half of all homes had insulation that was of some concern, although only every fourth home had an insulation

Table 2. Areas Where Need Identified, the Intervention Pathways and Delivery.

Intervention area	Need identified (count and percentage out of all clients)	Action attempted (count and percentage out of households where need identified)	Intervention delivered (count and percentage out of those where action attempted)
Mold	836 (93.4%)	777 (92.9%)	774 (99.6%)
Beds	222 (24.8%)	222 (100%)	185 (83.3%)
Bedding	389 (43.5%)	389 (100%)	374 (96.1%)
Insulation	426 (47.5%)	172 (40.4%)	66 (38.4%)
Carpets	112 (12.5%)	76 (67.9%)	27 (35.5%)
Curtains	377 (42.1%)	355 (94.2%)	260 (73.2%)
Heating	751 (83.9%)	609 (81.1%)	568 (93.3%)
Ventilation	636 (71.1%)	217 (34.1%)	41 (18.9%)
Draughts	738 (82.5%)	472 (64.0%)	468 (99.2%)

Table 3. Percentage of Well Homes Households for Which Other Interventions Were Pursued, and the Proportion Delivered.

Intervention area	Needed (count and percentage)	Delivered interventions (and relative percentage, out of those where action attempted)
Minor repairs	285 (31.8%)	96 (33.7%)
Referral for social housing relocation	198 (22.1%)	22 (11.1%)
Referral for private/community housing relocation	12 (1.3%)	0 (0.0%)
Health referral	69 (7.7%)	56 (81.2%)
Social referral	176 (19.7%)	142 (80.7%)
Support with power bills	134 (15.0%)	128 (95.5%)
Injury prevention measures	92 (10.3%)	81 (88.0%)

referral made. Insulation was successfully delivered only 38.4% of the time.

The delivery rate of other interventions also varied considerably (Table 3). Health and social referrals were successfully delivered in 80% of cases. Minor repairs were needed by 31.8% of clients, but delivered in only one third of these cases. New public housing was difficult to achieve; 198 referrals were made for public housing relocation, and this was only accomplished in 22 (or 11.1%) of cases.

The outcome of the insulation referral was only known for 147 out of the 172 clients. For the 63 clients where insulation was needed but not installed, the reasons are detailed in Table 4. There were still 43 (25%) clients needing insulation where the process was ongoing; 88 homes that needed insulation were private rentals.

Of the 35 public rental properties that have had their insulation referrals closed, 31 (88.6%) of these were successful. In private rentals, however, the success rate out of the 81 referrals that have been closed was less than 40%, with only 29 referrals resulting in delivery of insulation to that household.

Discussion

Well Homes demonstrates the potential of partnerships between community organizations, researchers, and the health system to improve health and prevent ongoing illness. Both in New Zealand and internationally, health agencies are recognizing the importance of partnership models to address wider social determinants of health. The United States has seen collaboration between Medicaid programs and state and local housing authorities for housing-related services (Paradise & Ross, 2017). Investment in affordable housing by Nationwide Children's Hospital in Columbus, Ohio, is another example of how health is involved in addressing the social determinants of health (Healthy Homes, 2019). Kaiser Permanente, America's largest nonprofit health care system, has recently signaled investment into addressing inadequate housing through its $200 million community loan fund (Dubb, 2019). Improving the housing quality of existing housing stock is a critical part of addressing housing as a social determinant of health. This study gives insight into some of the challenges in delivering services like Well Homes to vulnerable populations, in a context of minimal housing regulation.

That a significant proportion of the clients are under five years old makes a service such as Well Homes important, as very young children are physiologically vulnerable to unhealthy home environments and spend almost all their time in that setting (Khajehzadeh & Vale, 2017). Targeting children also has the potential for realizing multiple co-benefits over a lifetime's worth of outcomes (Braverman & Barclay, 2009). Reduction of child poverty and improvement in child well-being is focus of the New Zealand government. A Child and Youth Well-being Strategy is being developed to improve living conditions and outcomes for children in New Zealand, particularly for the most vulnerable (Department of Prime Minister and Cabinet, 2019). Our previous work has shown that improved home heating leads to immediate health effects

Table 4. Breakdown of Reasons for Incompletion of Insulation Interventions.

Reason	Count	Relative percentage
Family-related[a]	23	36.5%
Landlord-related[b]	23	36.5%
Will proceed independently	6	9.5%
Home cannot be insulated	5	7.9%
Other	6	9.5%

[a]Could not contact family for initial assessment, or to get landlord's details, or family opted out or moved. [b]Could not contact landlord to get consent for assessment or to discuss quote, or they declined.

(Free et al., 2010). Efforts to improve child well-being should include strategies to improve home environments.

Māori and Pacific peoples are overrepresented in the Well Homes population. These groups are identified as eligible for the program at rates far in excess of both regional and national demographics breakdowns. Increasing pressure in the housing market over the past two decades, coupled with reduced investment in public housing until the recent change in government, has contributed to increasing housing instability for Māori and Pacific people (Johnson et al., 2018). A strength of the partnership model of Well Homes is the inclusion of a Māori organization; programs like Well Homes should ensure that appropriate organizations and services are included for the populations served.

We have noted that the rates of referrals for the various intervention types, and their successful delivery, varied substantially. This is partly explained by gaps in rental housing regulation. Almost half of all clients were living in public housing, while the majority of the remainder were living in private rentals. Delivered interventions tended to be those that could immediately be actioned by the assessor, without recourse to the landlord. Where improvements were needed in public housing they were generally delivered. However, in the case of private rentals, landlords were a barrier to the delivery of interventions that required capital investment (e.g., insulation, ventilation). Staff reported that landlords did not view these issues as part of their responsibility; and families living in these properties were concerned about having Well Homes staff contact their landlord to advocate on their behalf for fear of retaliatory notice. Although families in public housing also were sometimes reticent about bringing attention to their tenancy for any reason, state-owned public housing has greater accountability and responsibilities than private landlords do. In theory, private rental tenants also have the ability to agitate for better housing through a Tenancy Tribunal; however, a common theme was families having distrust of advocacy that might in any way further destabilize their living situation (Chisholm et al., 2019). The number of relocations into public housing was also low. This situation is because demand for public housing has grown in New Zealand, from 4,771 individuals on the waitlist in December 2016, to 10,712 in December 2018 (Ministry of Social Development, 2018).

In 2017, during the study period, New Zealand's Parliament passed an Act ensuring minimum standards for rental properties. The Healthy Homes Guarantee Act comes into force for new tenancies in 2021 and for existing tenancies in 2024 (New Zealand Ministry of Housing and Urban Development, 2019). It establishes minimum enforceable requirements and compliance timeframes around heating, insulation, ventilation, moisture ingress, drainage, and draught stopping. This law will see enforceable requirements in place around all rentals to meet minimum standards of housing quality, although the enforcement and auditing of this will continue to be a challenge. Where standards exist they will not necessarily allay tenant fears about straining the relationship with their landlord, particularly in a context in which tenancy laws and systems favor landlords (Chisholm et al., 2018). However, in the case of tenants who are willing to talk to their landlord about housing improvements, access to an advocate increases the chance that their housing will be improved (Chisholm et al., 2017). Continued monitoring of interventions as part of our ongoing research will test whether stronger rental housing regulation result in improved uptake (Healthy Housing/He Kainga Oranga, n.d.). Deferred maintenance in owner-occupied properties also remains a considerable challenge in implementing healthy homes programs (Chisholm et al., 2019).

The results in this article demonstrate that the Well Homes program has led to a high rate of successful interventions. The literature discussed indicates that these interventions are likely to result in health improvements. A recent initial analysis of the Healthy Homes Initiative, the nationwide program of which Well Homes is one part, shows that the program is indeed having a significant impact on population health for those referred. Over its first year of operation there were more than 1,500 prevented hospitalizations estimated to be directly attributable to the program as well as fewer GP visits and pharmaceutical dispensings, resulting in cost savings to the health system. We will continue to monitor health and other outcomes connected to the program (Pierse et al., 2019).

We have shown that the most significant barrier to implementing recommended interventions was where private landlords were reluctant to make capital investments. This situation reinforces the need for regulation to ensure that housing is of a sufficient quality to support health and well-being. Without these measures, interventions like Well Homes are compromised by a poorly regulated market-driven housing system, which fails to protect and support vulnerable populations. Notably, many of the interventions provided by Well Homes were supported by a philanthropic trust. While this example demonstrates the ability of the private sphere to support some health and well-being initiatives, the experience with private landlords underlines the need for governmental investment and regulation to ensure healthy housing. Our ongoing quantitative and qualitative work will

continue to assess barriers to uptake as well as health outcomes resulting from participation in Well Homes (Healthy Housing/He Kainga Oranga, n.d.). This knowledge will serve as a tool to advocate to policymakers: first, for expanded participation in program such as Well Homes; and second, for a healthier housing stock, by improving regulation of rental housing, increasing public housing numbers, and through funding mechanisms that support cross-tenure housing improvements.

Conclusions

Good-quality, secure, affordable housing is a major determinant of health. In addition to state-funded housing policies to achieve this goal, targeted interventions using social partnerships can deliver effective and efficient housing improvements. In the absence of more overarching housing reforms, a strength of this intervention is in engaging with families directly. Well Homes provides a mixture of immediate and practical interventions, education, connection with social services, and advocacy for more substantial structural home improvements to help families keep their home warmer, drier, and healthier. The development of a national housing policy, which recognizes the lack of healthy choices for low-income households, with a targeted approach to these households through a local partnership model that sits behind it, represents a strong new public health strategy that has the potential to improve health outcomes and reduce health inequalities.

Authors' Note

Maddie White is now at the University of Bremen.

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Note

1. Oranga Tamariki (Ministry for Children) finding of abuse or neglect; caregiver with a Department of Corrections criminal history; mother with no formal qualifications; long-term benefit receipt.

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