

A study of New Zealanders motivations towards increasing native backyard planting

Megan Burfoot, Shanta Budha-Magar,
Amirhosein Ghaffarianhoseini and Ali Ghaffarianhoseini
Auckland University of Technology, Auckland, New Zealand

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Abstract

Purpose – Urban backyards hold both aesthetic and practical value, offering significant potential for native biodiversity conservation within cities. Homeowners, as the primary managers of these spaces, play a crucial role in determining whether their backyards contribute to ecological sustainability by planting native species. This study aims to investigate how New Zealand homeowners' attitudes, behaviours and motivations influence their engagement with native planting, and identifies effective strategies to encourage this practice.

Design/methodology/approach – This study used an online survey targeting a diverse sample of New Zealand homeowners, designed to assess their perceptions, motivations and barriers related to native planting. Correlational and regression analyses were used to identify the factors most strongly associated with the likelihood of increasing native planting in urban backyards.

Findings – Homeowners with healthier backyards, greater native plant coverage and those who spend 6–8 h per week maintaining native plants exhibit greater satisfaction with their backyards. Key motivations for native planting include attracting wildlife, enhancing aesthetics and contributing to ecological sustainability. Younger homeowners, Maori and Pacific communities and those dissatisfied with their current backyards are particularly inclined to increase native planting. Targeted financial and educational initiatives could significantly boost native plant coverage in urban backyards, contributing to both homeowner satisfaction and broader environmental goals.

Originality/value – While the role of urban backyards in biodiversity conservation is recognized, there is limited understanding of how homeowners can be motivated to enhance native plant coverage. This study addresses this gap by examining the factors that drive or hinder native planting among New Zealand homeowners.

Keywords Urban backyards, Native planting, Indigenous planting, Landscape design

Paper type Research paper

Key highlights

- An online survey is conducted across New Zealand to understand homeowners' motivations towards native backyard planting.

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- Backyard happiness and backyard health are positively correlated, and higher backyard native plant coverage significantly enhances backyard happiness.
- Younger homeowners, those less satisfied with their current backyards, and Māori and Pacific participants show a higher motivation towards native landscaping.
- Financial incentives and educational resources are likely to be the most effective strategies to encourage native planting.
- For maximum success, incentive strategies should target the personal motivations and challenges of younger homeowners and Māori and Pacific homeowners regarding the conversion of lawns to native plantings, namely, financial and educational barriers.

1. Introduction

Urban backyards provide both aesthetic and practical benefits within urban ecosystems (Gerolemou, 2023; Lerman *et al.*, 2023; Smallwood and Wood, 2023; Sveding, 2023). Most of the people use their backyards to grow vegetables, medicinal and ornamental plants, or simply grasses (Freeman *et al.*, 2012; Longhurst, 2006). These spaces reflect both nature and culture, can blend private and public realms, foster individual and social creativity and serve as areas for both leisure and work (Lepionka-Strong, 2013). Backyard characteristics such as size and vegetation composition can significantly impact urban biodiversity (Gonçalves *et al.*, 2021; Kanosvamaha, 2023; Lerman *et al.*, 2023; Smallwood and Wood, 2023). However, due to increasing population worldwide, urban green spaces are declining. This reduction in size can negatively affect health and biodiversity, especially including avian diversity (Longhurst, 2006; van Heezik *et al.*, 2013). The average backyard size in New Zealand has shrunk from 335 m² in the 1980s to about 93 m² by the 2000s (Moore, 2017). Furthermore, hard-surfaced gardens reduce native plant presence, though homeowners express willingness to collectively plant vegetation for biodiversity (Dixon, 2022). These trends contribute to a reduction in nature connection, and is a barrier which increased planting could overcome (Fehnker *et al.*, 2022; Samus *et al.*, 2023). Therefore, improving the quality of urban backyards, rather than increasing the number of backyards, is crucial for environmental quality and biodiversity conservation (Haaland and van den Bosch, 2015; Kanosvamaha, 2023).

To mitigate the decline in urban green spaces and maintain biodiversity, it is essential to promote the planting of native species in urban backyards (Samus *et al.*, 2023; Stanley and Galbraith, 2024). Native plants play a critical role in preserving local ecosystems by providing habitat and food for indigenous wildlife, thus supporting urban biodiversity (Smallwood and Wood, 2023). However, urban greening must be context-specific to avoid inadvertently harming biodiversity, as general approaches may disconnect homeowners from native species (Stanley and Galbraith, 2024). Native vegetation is better adapted to local conditions, requiring less water and maintenance and can help restore natural ecological processes (Hemi, 2018). The concept of “plant signatures”, which has been popular in New Zealand since the 1990s (Moore, 2017), embodies this approach by encouraging plantings that reflect the essence of a place’s natural history. By adopting native plantings, homeowners contribute to the conservation of New Zealand’s unique flora and fauna, ensuring that urban areas remain ecologically resilient (Tallamy, 2009).

Several factors influence homeowners’ decisions to plant native species in their backyards (Samus *et al.*, 2023). Cultural influences, such as the historical preference for European cottage styles, have shaped gardening practices in New Zealand. However, there

has been a gradual shift towards South Pacific sub-tropical styles (Longhurst, 2006) and an increased emphasis on native species through initiatives like the “Going Native” programme (Given and Spellerberg, 2004). Different ethnic groups have different planting preferences, for example, research shows that Māori prefer less manicured landscapes, and have greater familiarity with native flora (Heyzer, 2024). Knowledge and awareness about the ecological benefits of native plants are crucial for encouraging native plantings. Studies have shown that when homeowners are informed about the advantages of native species, they are more likely to incorporate them into their landscapes (Freeman *et al.*, 2012; Kanosvambhira, 2023; Shaw *et al.*, 2017). There are numerous Indigenous plant species that Māori (New Zealand’s indigenous people) have traditionally used for food, medicine, rituals and ornamentation (Dana and Hipango, 2011). These native species, ecologically suited to the habitat, should be recognized and used in biodiversity conservation efforts.

While some landscape companies are working to encourage private landowners to plant native species, the extent of implementation remains uncertain. Historically, promotion of private tree planting by New Zealand farmers in the 1920s was aimed at addressing timber shortages, though faced opposition from private nurserymen (Sveding, 2023). Currently, organizations such as the New Zealand Department of Conservation, the Auckland Council (Auckl, 2024) and various restoration and landscaping companies (LEARNZ, 2024) are promoting the planting of native species to restore native biodiversity. Similarly, a Predator Free 2050 initiative in Wellington, New Zealand has enhanced biodiversity through community engagement (Martinez-Almoyna and Tuinder, 2024). These species include *Muehlenbeckia astonii* (Tororaro), *Metrosideros bartlettii* (Bartlett’s rātā), *Metrosideros umbellata* (Southern rātā), *Melicytus ramiflorus* (Māhoe), *Hebe parviflora* (Hebe), *Sophora fulvida* (Kopai), *Leptospermum scoparium* (Manuka), *Rhopalostylis sapida* (Nīkau palm) and *Coprosma* species. Nevertheless, despite these native trends, many people still plant exotic species in their backyards (van Heezik *et al.*, 2013). This is driven by the aesthetic appeal of these plants or as in the case for immigrants, a chance to sustain cultural qualities (van Heezik *et al.*, 2013; Wen Li *et al.*, 2010).

1.1 Research objectives

Encouraging native planting in urban backyards is vital for supporting biodiversity and maintaining ecological integrity. This study aimed to understand the attitudes and behaviours of homeowners towards native planting, to answer the following research question (RQ):

RQ1. How can native planting coverage in homeowners’ backyards be increased?

To fulfil this aim, an online survey of New Zealand homeowners was conducted, guided by the following research objectives:

- identify the current happiness, health and time spent in homeowners’ backyards and explore the relationships between these variables;
- explore the current motivations behind homeowners planting decisions;
- examine how demographic factors such as age, ethnicity, gender and socio-economic status influence homeowners’ likelihood to increase native planting coverage;
- determine the key barriers that prevent homeowners from planting native species and identify the motivations that encourage them to engage in native planting;
- assess the effectiveness of various incentives in promoting native planting among homeowners; and

- examine ways to increase the conversion of lawn to native, by examining the motivations behind planting, the most effective incentives for homeowners and the demographic factors increasing the likelihood for planting natives.

1.2 Background literature

The trend of converting natural landscapes into human settlements, often through privatization, has been steadily increasing (Colsaet *et al.*, 2018). This urban expansion has led to a decline in biodiversity in recent times. Therefore, it is crucial to promote well-designed urban backyards that enhance habitat connectivity, thereby mitigating the negative impacts of uncontrolled urban sprawl (Cameron, 2023; Tarabon *et al.*, 2020). Numerous studies worldwide have focused on the design, components and ecological benefits of urban backyards (Breed *et al.*, 2022; Colding and Barthel, 2013; Fox-Kämper *et al.*, 2018).

Global perspectives: Recent research highlights the importance of backyard design, not only for biodiversity conservation, but also for incorporating planting with significant ecological value (Hostetler, 2021). For instance, a project in Melbourne, Australia, demonstrated that proper design, construction and maintenance of urban backyards with cost-effective and ecologically significant plantings, such as native species, are essential for creating more diverse urban landscapes (Tan *et al.*, 2022). Moreover, in South Africa, purposefully engineered native grassland backyards have enhanced biodiversity (Breed *et al.*, 2022). A study in Toronto, Canada, found that an increased number of woody plants in backyards boosted invertebrate abundance (Sperling and Lortie, 2010). Not soon after, an Australian study recommended increasing urban green space, enhancing vegetation structure and encouraging homeowners to plant trees and shrubs to improve urban bird diversity (Ikin *et al.*, 2013). In northwest Ohio, USA, local characteristics of backyards, such as the abundance of flowers, the height of vegetation and the number of woody plants, as well as the size of gardens improved bee diversity (Pardee and Philpott, 2014). Similarly, in a Southeastern Brazilian city, diverse backyards with tall trees and shrubs near isolated large trees and other green spaces increased native bird species diversity (Gonçalves *et al.*, 2021). Finally, a Melbourne case study illustrates how “Biodiversity Sensitive Urban Design” integrates biodiversity into urban development from the outset, benefiting nature, aesthetics, liveability and stakeholder engagement in the Fishermans Bend project (Kirk *et al.*, 2021).

Culture and immigration: Urban backyards and their cultivation reflect the culture of homeowners. Gardening is an invaluable activity for households, providing physical and mental health benefits, a sense of ownership and identity, social interaction, connection with nature and the production of domestic goods (Freeman *et al.*, 2012). For example, a study on Australian backyard gardens of immigrants found that their diverse cultural backgrounds influenced their gardening styles in Sydney, Australia (Head *et al.*, 2004). In New Zealand, Lepionka-Strong (2013) examined the Italian community’s backyard traditions in Island Bay, Wellington, and found they reflected closely-knit Italian communities’ designs. Another study on older Chinese immigrants to New Zealand revealed that their backyard characteristics mirrored their gardening styles in China while adapting to new gardening types in their current locales (Wen Li *et al.*, 2010). Research on Japanese backyards in New Zealand found an integration of Japanese and New Zealand ideas, materials and traditions (Baker, 2010). Promisingly, New Zealand has adopted practices rooted in Europe and the USA that focus on urban green spaces, greenbelts, greenways and sustainability, with an emphasis on low-impact urban design (Ignatieva *et al.*, 2008). Around the globe, ecologists, landscape architects and other groups are collaborating to relate landscape design to

ecosystem structure and function, to support biodiversity, create and restore habitats and reintroduce native species in cities (Müller *et al.*, 2013).

1.3 Incentive strategies to increase native planting motivation

Educational interventions: While various biodiversity incentive measures are in place or under consideration in New Zealand, there is little evidence of their coherent implementation towards achieving common biodiversity objectives, particularly in urban backyards (Clough, 2000). To encourage native plantings in urban backyards, it is crucial for homeowners to be informed about native plants (Hemi, 2018). Without understanding the benefits of native plants, homeowners cannot make informed decisions about what to plant in their backyards. A survey conducted in remnant bush areas in Christchurch, New Zealand, found that woody plants were removed from nearby urban backyards due to a lack of information about the native species whose seeds were dispersed by birds from the bush (Doody *et al.*, 2010). Another study in Perth, Australia found that subsidized seedlings are the highest-valued programme component for verge-conversion (Doll *et al.*, 2023). On the contrary, a study in Phoenix, Arizona discovered that knowledge about native backyard planting did not predict native plant presence (Wheeler *et al.*, 2022). Nonetheless, homeowners often lack expert knowledge about the best native species to plant and the Māori values associated with these plants. Research suggests that initiatives to assign and reinstate indigenous names for native plants in New Zealand could significantly improve native plant populations (Gillman and Wright, 2020). Accordingly, survey studies in urban backyards in Dunedin indicate that working directly with homeowners is the most effective way to foster positive environmental change in cities (Freeman *et al.*, 2012; van Heezik *et al.*, 2013).

Financial incentives and policy change: Economic factors also influence the quality of urban backyards. A study in Raleigh, North Carolina, found a positive correlation between income and preference for backyard plantings (Peterson *et al.*, 2012). This study also concluded that middle-income homeowners should receive sufficient incentives to maintain sustainable landscapes. Similarly, a door-to-door survey in Syracuse, New York, revealed that economic incentives, aesthetics and knowledge of environmental issues influence homeowners' willingness to implement greening measures for stormwater management on their properties (Baptiste *et al.*, 2015). In the USA, tree-protection laws have generally helped cities maintain or increase tree cover, though in some areas, these protections alone do not fully explain the increase in tree cover (Livesley *et al.*, 2019). Another study highlights methods to increase the adoption of native plantings on urban verges, emphasizing financial assistance and subsidized seedlings as effective incentives (Doll *et al.*, 2023), and tailoring these programmes to different population segments is also important. In addition, Cameron (2023) advocates for policy and practice changes, including regulation, financial incentives and stronger promotion of well-vegetated backyards to enhance ecosystem services and address biodiversity loss in urban areas. As an example, community-led pest control in Auckland's backyards has positively affected native bird populations, showing the social and ecological benefits of such initiatives (Gerolemou, 2023). In contrast, a survey in the USA, Ohio discovered that homeowners were not keen to add native plantings, and were no more keen to do so when incentives were offered (Davis and Stoyko, 2022). A study examining urban forests in Great Britain found differences in tree characteristics between privately and publicly owned land, underscoring the importance of involving private tree owners in urban forest management strategies to enhance climate resilience and biodiversity (Chambers-Ostler *et al.* 2024). Other studies have explored innovative gardening strategies to boost backyard planting, such as collective planting efforts among neighbouring backyards. However, these

initiatives often face resistance due to concerns over privacy and the desire to maintain individual control over garden spaces (Dixon, 2022).

2. Method

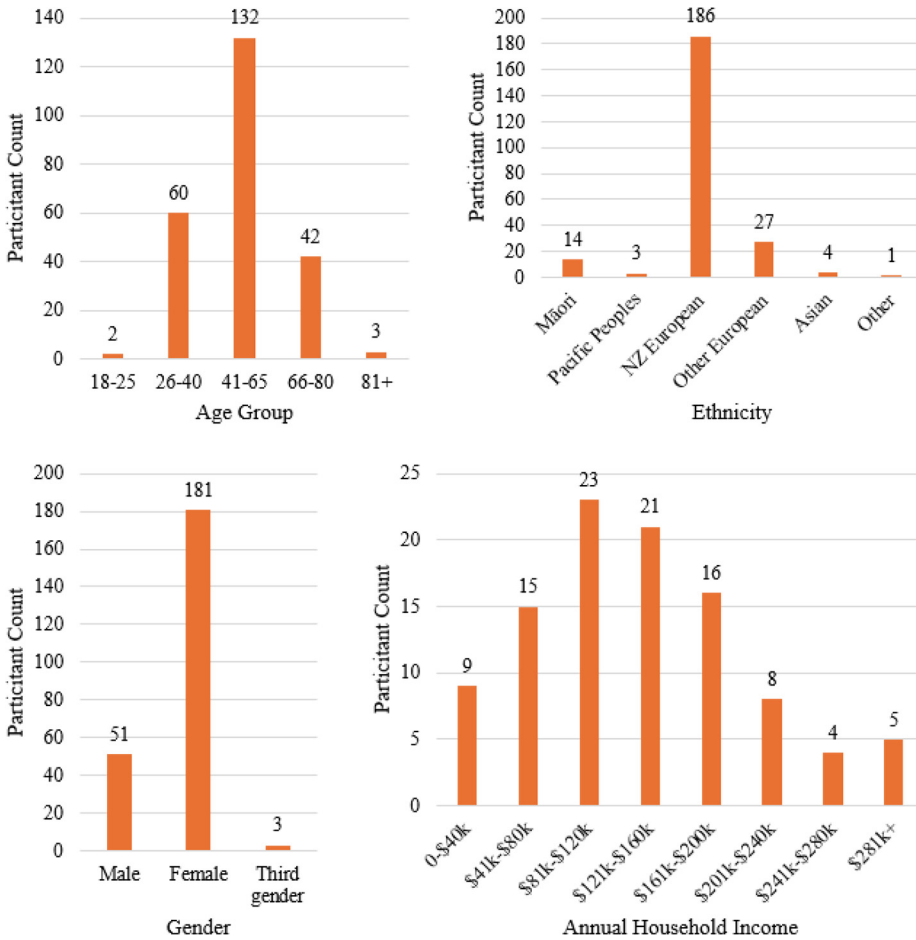
An online survey was conducted to gather data regarding the current conditions of New Zealand home-owners' backyards, as well as their behaviours and attitudes towards native planting, drawing inspiration from prior studies (Freeman *et al.*, 2012; Shaw *et al.*, 2017) (Appendix). The survey was distributed widely across New Zealand by posting the link on various online community public boards, social media platforms and through email lists to reach a diverse audience. Over the course of 12 weeks (February–April, 2023), 458 responses were collected, of which 312 were sufficiently complete for inclusion in the analysis.

Survey design: The survey initiated by capturing general demographic information and property characteristics. Respondents were then asked about the general health of their backyard, how happy they are with their backyards, how much time they spend in their backyards, their motivations behind planting native plants in their backyards, the current extent of their native planting as a percent of their backyard, their time spent maintaining various planting types, how likely they would be to convert a portion of their lawn to native plantings and why they would or would not want to. The final data set included only those who had provided informed consent and displayed a satisfactory question response rate, including at least 90% of the demographic details and backyard composition survey sections.

Survey demographics: Most respondents fell within the age group of 41–65 years, indicating a significant representation from the middle-aged to late middle-aged population (Figure 1). The ethnic composition of the participants mainly consisted of individuals of NZ European descent, with additional representation from Māori, Pacific and other European ethnicities, which enriched the study's cultural perspective and allowed for cross-cultural comparisons. The gender distribution leaned towards female participants, at 77%. Income levels varied widely, encompassing a broad spectrum of financial circumstances. From respondents with lower income brackets (0–\$40,000) to those in higher income tiers (\$281,000 and above), the study captured the attitudes and behaviours of individuals from various socio-economic backgrounds.

Property distribution: The research encompassed participants from across New Zealand, ensuring representation from various regions (Figure 2). Although a substantial portion of respondents hailed from Auckland (102), it is noteworthy that this aligns with the region's significant population, accounting for approximately one-third of the country's total population, as indicated by the 2018 census (States NZ, 2018). Nevertheless, although the distribution of data points across regions closely mirrors the actual population of New Zealand, some regions had only one or no data points. As a result, it is not feasible to conduct any analysis based on region to identify correlations. Therefore, the region variable was excluded from all analyses. For future research focused on regional differences in planting motivations and preferences, larger sample sizes representing each region would be necessary.

Data analysis: The survey data was analysed using StatsIQ from Qualtrics, which provided a comprehensive statistical analysis framework. Figure 3 shows all variable correlations explored in the study. Interestingly, the variables which showed no significant relationship with any other variables include gender, household income, ownership length, property size, exotic coverage, lawn coverage and preference for natives or exotics (Figure 3).

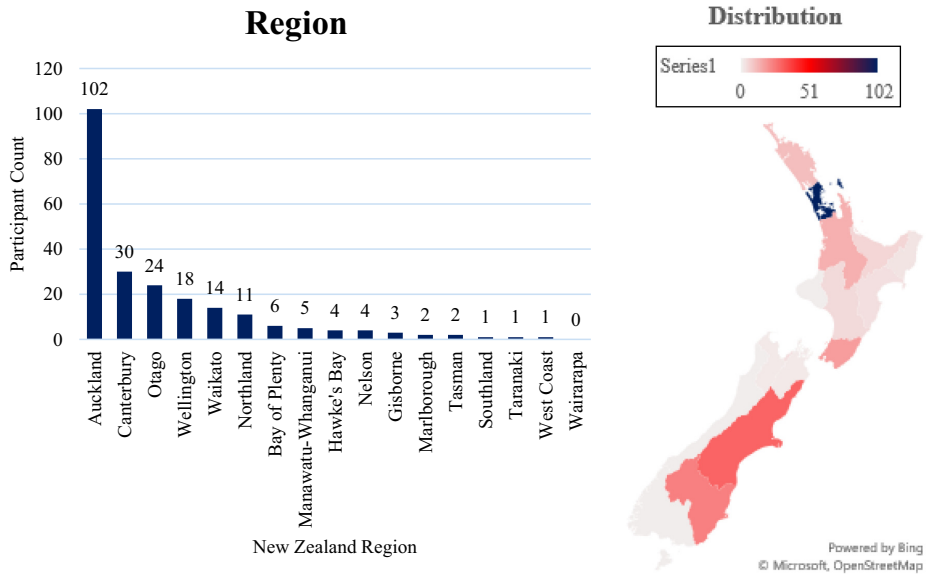


Notes: Top left = age group; top right = ethnicity; bottom left = gender; bottom right = annual household income

Source: Authors' own work

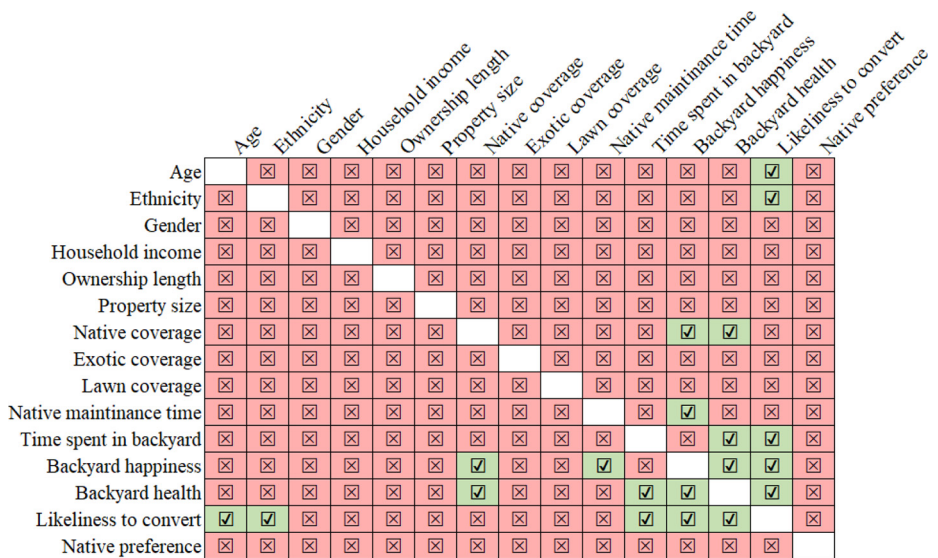
Figure 1. Survey participant demographics

Descriptive statistics were initially used to summarize participant demographics, behaviours and attitudes, providing an overview of the data distribution and central tendencies. The results are discussed in relation to factors such as time spent in backyards, maintenance of native plants, age and ethnicity, particularly in determining what influences participants' likelihood to convert a portion of their backyard to native plantings. Pearson's correlation analysis was then used to explore relationships between continuous variables such as backyard health, backyard happiness and time spent in the backyard. In addition, analysis of variance (ANOVA) was



Note: Right = Geographical distribution
Source: Authors' own work

Figure 2. Left: Participant property location by New Zealand region



Source: Authors' own work

Figure 3. All variable correlations explored in study, indicating which variables significantly correlated

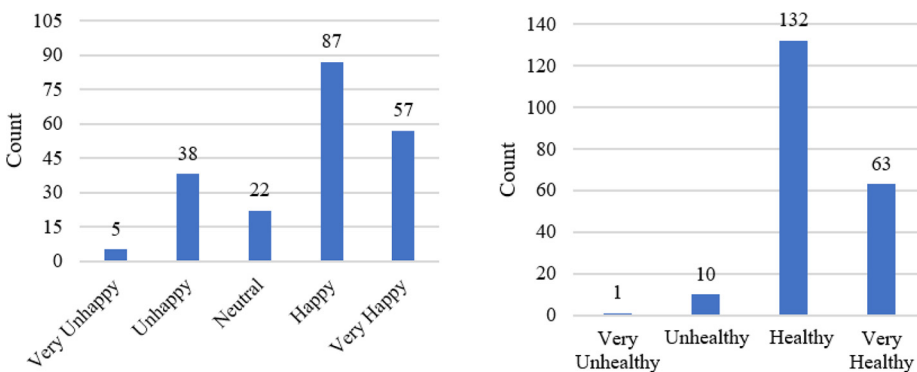
applied to assess the impact of categorical variables on continuous outcomes. To examine factors influencing the likelihood of converting a portion of the lawn to native planting, a series of correlation analyses were conducted. Finally, a multiple regression analysis was conducted, including both linear regression for continuous dependent variables and logistic regression for categorical outcomes. The regression models helped in understanding the influence of various predictors such as age, ethnicity and backyard satisfaction on the likelihood of participants converting portions of their lawns to native plantings. The regression analysis provided both the strength and direction of these relationships, quantifying the impact of each independent variable on the dependent variable.

Limitations: Firstly, the research aims to gain a comprehensive understanding of backyard management and attitudes, rather than pursuing broad generalizations. Thus, it is acknowledged that the survey primarily relies on self-reported perceptions. Nonetheless, the careful questionnaire design, the diversity inherent in the sample, obtaining informed consent and transparently acknowledging the data's reliance on perceptions collectively enhance the academic robustness of the findings. Secondly, while the study achieved a diverse range of responses in terms of age, ethnicity and income levels, the sample was not explicitly stratified to represent the proportions of residents across all regions of NZ. As a result, certain regions had either very few or no respondents, limiting the ability to generalize findings at a regional level. This lack of proportional sampling introduces potential biases and may not fully capture the attitudes and behaviours of the broader NZ population towards native backyard planting.

3. Results and analysis

3.1 Backyard health and backyard happiness

Respondents were generally happy with their backyards (Figure 4), with a mean score of 3.73 / 5 for backyard happiness. Moreover, participants had healthy backyard levels, with a mean score of 3.25 / 4. Few participants were very unhappy with their backyards (five participants), and only one participant had a very unhealthy backyard.



Source: Authors' own work

Figure 4. Left: Participant backyard happiness levels. Right: Participant backyard health levels

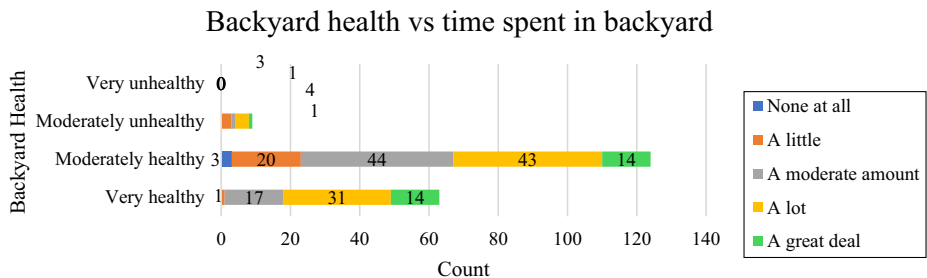
Pearson’s correlation revealed that backyard health was positively correlated with time spent in backyard (Figure 5) and backyard happiness (Figure 6). Time spent in backyard showed very clear statistical significance (p -value: $5.89e-05$) with backyard health, with a small effect size (Pearson’s R : 0.279). Similarly, backyard happiness showed very clear statistical significance (p -value: $1.56e-09$) with backyard health, with a medium effect size (Pearson’s R : 0.405).

Backyard happiness also positively correlated significantly with backyard native coverage (Figure 7). Pearson’s correlation revealed very clear statistical significance (p -value: $1.36e-05$) with a small effect size (Pearson’s R : 0.315).

Interestingly, conducting an ANOVA test, backyard happiness also displayed a statistically significant relationship (p -value: 0.034) with time spent maintaining native plants (very small effect size – Cohen’s f : 0.19). People spending 6–8 h per week maintaining these plants were on average happiest with their backyards (Figure 8).

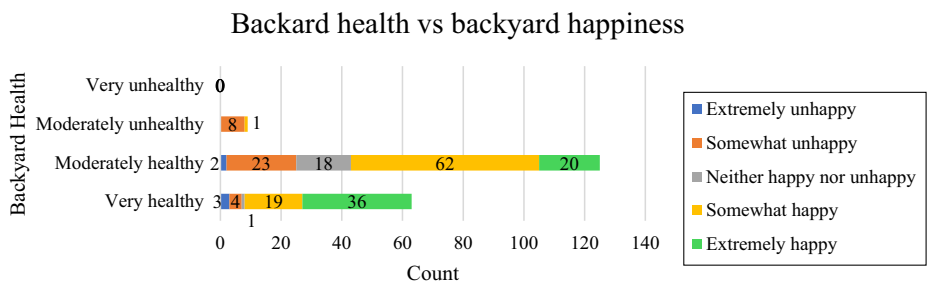
3.2 Likeliness of participants to convert portion of backyard to natives

Participants typically prefer native species over exotic species (125 participants) (Figure 9), with very few participants having no preference, or preferring exotic species. A noteworthy group of participants enjoy both natives and exotics, for different reasons (91 participants). Despite these promising results, there is a range of participants’ likeliness to convert a portion of their backyard lawn to natives (Figure 9). With a mean likeliness of 3.29 / 5.0,



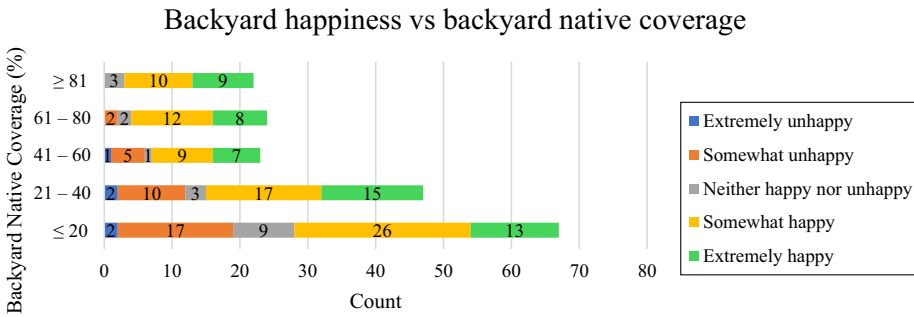
Source: Authors’ own work

Figure 5. Correlation between backyard health and time spent in backyard



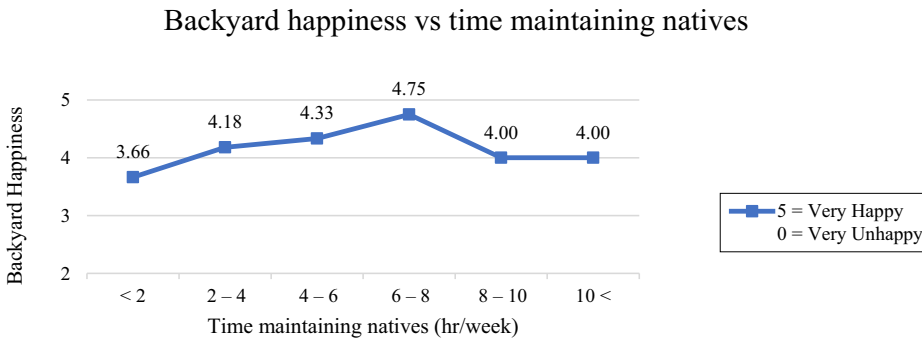
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Figure 6. Correlation between backyard health and backyard happiness



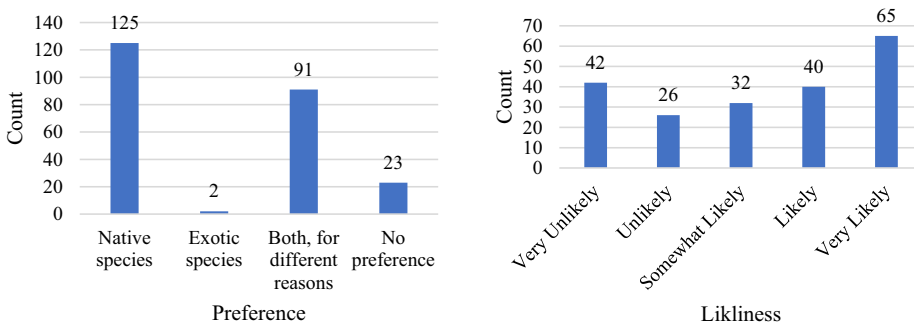
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Figure 7. Correlation between backyard happiness and backyard native coverage



Source: Authors' own work

Figure 8. Correlation between backyard happiness and weekly time spent maintaining natives



Source: Authors' own work

Figure 9. Left: Participants preference for native or exotic species. Right: Participants likeliness to convert a portion of their lawn to natives

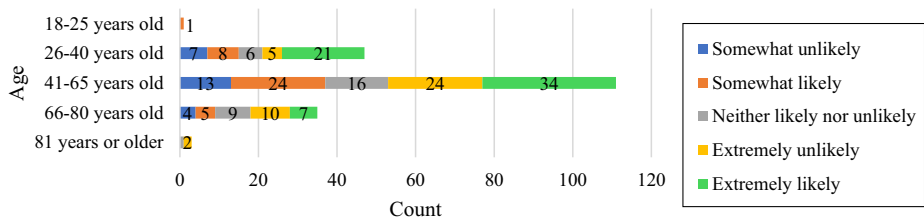
many participants are likely to make the conversion (105 participants), and a large group would be unlikely to make the conversion (68 participants).

Statistical analysis was conducted to examine which factors increase or decrease respondents' likeliness to convert their lawn to native planting. It was found that age, backyard happiness, backyard health and ethnicity all play significant roles in influencing individuals' decisions to convert their lawns to native landscapes. Younger individuals, those less satisfied with their current backyard, and those with less healthy backyards are more likely to consider native landscaping, while ethnic background also contributes to these preferences.

Age: Firstly, the data indicates a statistically significant negative correlation between the tendency to convert a lawn to a native landscape and the respondent's age group (Figure 10). This correlation, with a Pearson's R of -0.2208 , suggests that younger individuals are more inclined to embrace native landscaping (p -value: 0.0014).

Backyard health: Similarly, a statistically significant negative correlation is found between the desire to convert a lawn to native and the health of the backyard (Figure 11). The Spearman's Rho value of -0.1721 suggests that individuals with less healthy backyards are more inclined to consider native landscaping (p -value: 0.0086). Those with less healthy backyards may see native landscaping as a way to improve the overall well-being of their outdoor space.

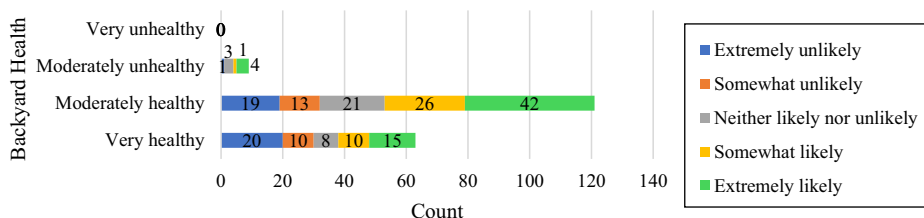
Likeliness to convert, dependent on age



Source: Authors' own work

Figure 10. Correlation between age and participants likeliness to convert a portion of their backyard lawn to natives

Likeliness to convert, dependent on backyard health



Source: Authors' own work

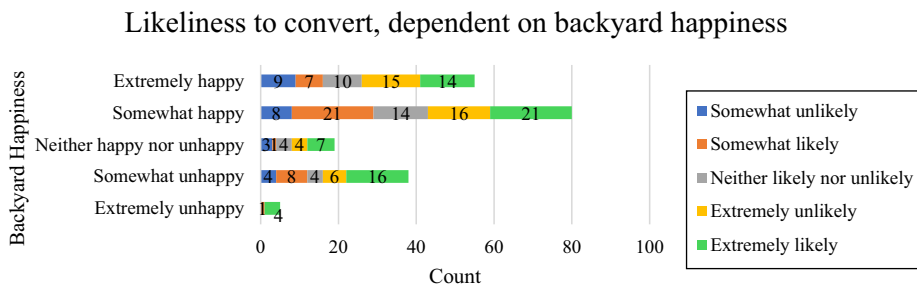
Figure 11. Correlation between backyard health and participants likeliness to convert a portion of their backyard lawn to natives

Backyard happiness: There is another statistically significant negative correlation between the inclination to convert a lawn to native and respondents' levels of happiness with their backyard (Figure 12). With a Pearson's R of -0.1830 , this correlation implies that dissatisfaction with the current state of the backyard may motivate individuals to opt for native landscaping (p -value: 0.014).

Ethnicity: An additional significant relationship is observed between ethnicity and the inclination to convert lawns to native landscapes, as indicated by the ANOVA analysis (p -value: 0.034) (Figure 13). The effect size (Cohen's f) of 0.205 indicates a moderate effect. Examining the average scores for different ethnic groups, it is apparent that Māori and Pacific respondents have a relatively higher inclination for native landscaping, while other European and NZ European respondents tend to have a lower inclination.

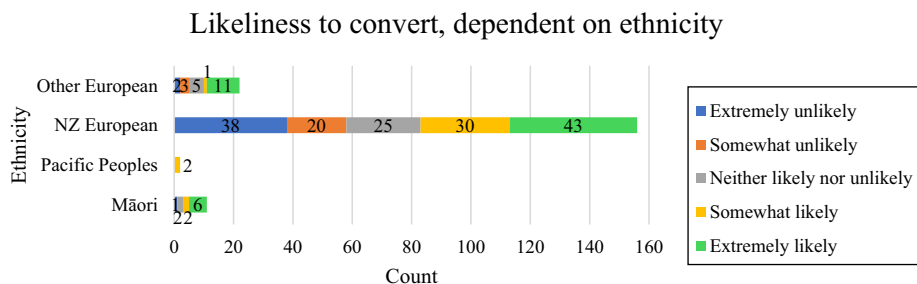
3.3 Likelihood to convert portion of lawn to native – regression model

In the regression analysis of the likelihood to convert a lawn to native plantings, explanatory variables were considered to explore the model in detail: age, ethnicity, backyard happiness, backyard health and time spent in backyard. Asian and Middle Eastern participants were removed from the regression model analysis due to sample size = 1. The most significant



Source: Authors' own work

Figure 12. Correlation between backyard happiness and participants likeliness to convert a portion of their backyard lawn to natives



Source: Authors' own work

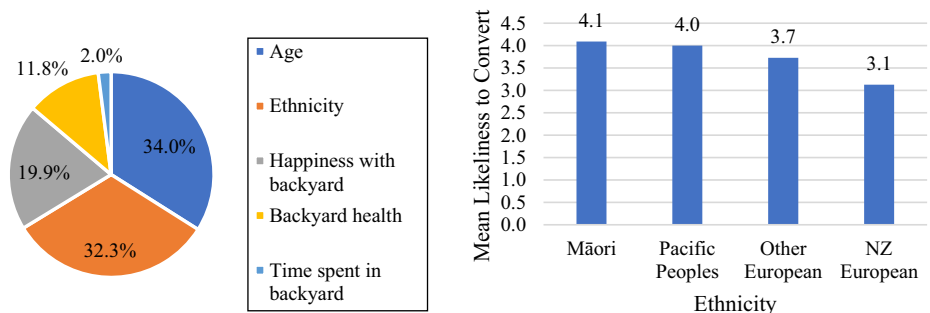
Figure 13. Correlation between ethnicity and participants likeliness to convert a portion of their backyard lawn to natives

predictors were age (variable importance: 10.3%, relative importance: 34%) (p -value: 0.016) and ethnicity (variable importance: 14.2%, relative importance: 32%) (p -value: varies by ethnicity) (Figure 14). The next most significant predictors were backyard happiness (variable importance: 1.1%, relative importance: 20%) (p -value: 0.097) and backyard health (variable importance: 1.9%, relative importance: 12%) (p -value: 0.303). The least significant predictor in the regression model was time spent in backyard (variable importance: 0.6%, relative importance: 2%) (p -value: 0.932). Age presented a negative coefficient of -0.346 , indicating that younger participants were more likely to convert their lawns to natives. Mean ethnicity data revealed Māori and Pacific Peoples were most likely to convert to natives. Backyard happiness obtained a negative coefficient of -0.212 , implying that individuals less happy with their backyards are more likely to consider converting it to a native planting. Similarly, backyard health achieved a negative coefficient of -0.317 , suggesting participants with lower backyard health are more inclined to convert their lawn to a native landscape. Finally, time spent in backyard is not a statistically significant predictor to the model.

The model has an R-squared value of 10.8%, indicating that the selected explanatory variables explain about 10.8% of the variance in the likelihood of converting a lawn to a native landscape. The adjusted R-squared value is 6.2%, suggesting that the model may have limited explanatory power. The model's statistical significance ($p < 0.05$) and the relatively low Akaike Information Criterion value of 753.263 indicate that it provides a reasonable fit to the data.

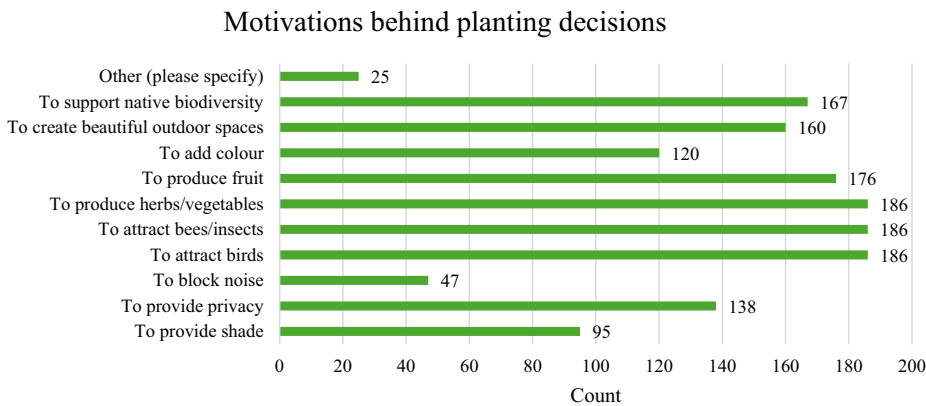
3.4 Motivations for planting both exotics and natives

The survey results reveal a diverse range of reasons why individuals choose to plant trees and shrubs in their backyards (Figure 15). Respondents were asked to select from a predefined list of motivations for planting, or to provide their own reasons in an open-text field. While a significant portion of respondents mentioned attracting wildlife – including birds and insects – as their motivation, others prioritize practical benefits such as producing herbs, vegetables and fruit. In addition, the desire for increased privacy, shade and the creation of aesthetically pleasing outdoor environments were noted. Furthermore, a large proportion also emphasized the ecological importance of supporting native biodiversity through their landscaping choices.



Source: Authors' own work

Figure 14. Left: Relative importance of regression model variables. Right: Mean likeliness to convert a portion of lawn to natives by ethnicity



Source: Authors' own work

Figure 15. Participants motivations behind their planting decisions

“Other” reasons cited for planting trees and shrubs included fostering creativity, inspiring others to follow suit and shielding pest eradication efforts from view. Practical considerations such as slope stability, temperature regulation and soil suitability were also mentioned. Fragrance, sharing flowers with friends and satellite visibility added aesthetic and personal dimensions to their choices. In addition, respondents noted wind blocking, weed control and the creation of habitats for wildlife, emphasizing ecological considerations.

3.5 General comments from participants

Respondents were finally given a chance to provide general comments about backyards, natives, exotics, challenges with planting and insights into their motivations and practises. Some respondents expressed challenges related to physical limitations, cost and lack of assistance in their gardening efforts. Concerns were raised about restrictions on planting due to easements and the importance of protecting established native trees. Financial considerations and the availability of affordable native plants were mentioned. Others highlighted the need for education and awareness about the importance of native plants for biodiversity and environmental protection. While some respondents were already dedicated to native planting, they acknowledged the need for targeted guidance and support, including information on suitable plant species and professional help. Some respondents also mentioned the importance of balancing native plantings with other backyard elements such as food production, aesthetics and recreational space. Finally, there was recognition of the challenges posed by invasive exotic species and the importance of policies and regulations in promoting native plant landscaping.

4. Discussion

4.1 Backyard health and happiness

The data indicate that overall, participants are generally content with their backyards, with mean happiness and health scores reflecting positive sentiments. A significant positive correlation was observed between backyard health and both the time spent in the backyard and backyard happiness. This suggests that increased time spent in the backyard may contribute to better backyard health, which in turn enhances overall satisfaction with the

space. Conversely, this result could explain that happier individuals may be more motivated to maintain and improve their backyards, resulting in better backyard health. Furthermore, individuals with a higher percent of backyard native planting report higher levels of happiness with their backyards. Native plantings yield significant benefits across ecological, anthropological and climate change dimensions (Breed *et al.*, 2022; Moro *et al.*, 2014; Pardee and Philpott, 2014). Native plants, adapted to local conditions, can provide food and shelter for native insects, birds and other wildlife, contributing to urban ecosystem resilience (Egli *et al.*, 2016; Ignatieva *et al.*, 2011). Therefore, the strategic incorporation of native plant species in urban environments plays a pivotal role in nurturing bird breeding and fostering thriving avian communities (Cardilini *et al.*, 2013; Paker *et al.*, 2014).

Interestingly, the time spent maintaining native plants also shows a statistically significant relationship with backyard happiness. Individuals spending 6–8 h per week maintaining native were on average happiest with their backyards, and this decreased with less or more hours of weekly maintenance. Although the effect size is small, it highlights that engaging with native plants, even for a few hours a week, can enhance the overall satisfaction homeowners derive from their outdoor spaces. Private homeowners are directly connected to their backyards and play a crucial role in maintaining these spaces to protect local biodiversity (Freeman *et al.*, 2012). Even small efforts in backyard maintenance by homeowners can lead to positive effects on urban conservation efforts (Clough, 2000).

4.2 *Participants current motivations for planting either natives or exotics*

The survey results reveal a broad spectrum of motivations for planting both exotic and native species in backyards, reflecting homeowners' diverse priorities. A significant portion of respondents cited the desire to attract wildlife, such as birds and insects, as a primary motivation for their planting decisions. This indicates an awareness of the ecological benefits that native plants provide, particularly in supporting local biodiversity. Native species are often better suited to providing habitat and food for indigenous wildlife, which in turn supports ecosystem health. However, the inclusion of exotic species in these plans suggests that aesthetics and other personal preferences, such as the desire for specific flowers or fruit, also play an influential role.

Practical considerations such as privacy, shade and creating aesthetically pleasing outdoor spaces were frequently mentioned, underscoring the role of plants in enhancing the functionality and comfort of home environments. These motivations highlight the dual purpose of backyard spaces, where ecological benefits and personal enjoyment are both valued. Shade and privacy not only contribute to a more enjoyable outdoor experience but also encourage more time spent in these spaces, which can lead to increased engagement in native planting. In addition, practical needs such as slope stability, temperature regulation and soil suitability further demonstrate that homeowners are making thoughtful, sustainable choices that align with long-term environmental resilience.

The survey also captured a range of personal motivations for planting, including creativity, inspiration and addressing specific challenges such as wind blocking and weed control. These responses illustrate the deeply personal nature of landscaping choices and suggest that while general strategies can promote native planting, they must also be flexible enough to accommodate individual preferences and circumstances.

4.3 *Willingness of participants to convert portion of backyard to native*

Younger individuals, those with lower backyard satisfaction, and those with less healthy backyards are more inclined to consider native landscaping. The negative correlations between age, backyard happiness, backyard health and the inclination to convert suggest that dissatisfaction with the current state of the backyard may drive interest in adopting native

plantings. This may be due to the perceived potential of native landscaping to improve the ecological and aesthetic quality of the backyard. Ethnicity emerged as a significant factor in the decision to convert lawns to native plantings. Māori and Pacific participants show a higher inclination towards native landscaping compared to other ethnic groups. This could reflect cultural values and a stronger connection to native species, which are often seen as integral to maintaining biodiversity and cultural heritage.

The regression model further illuminates the relative importance of various factors in predicting the likelihood of converting lawns to native plantings. Age and ethnicity stand out as the most significant predictors, followed by backyard happiness and health. However, the model explains only a small portion (10.8%) of the variance in the likelihood of converting to native plantings, indicating that other unexamined factors may also play a role. This suggests that while age, ethnicity and backyard satisfaction are important, there may be additional psychological, social or economic factors influencing these decisions that were not captured in this analysis.

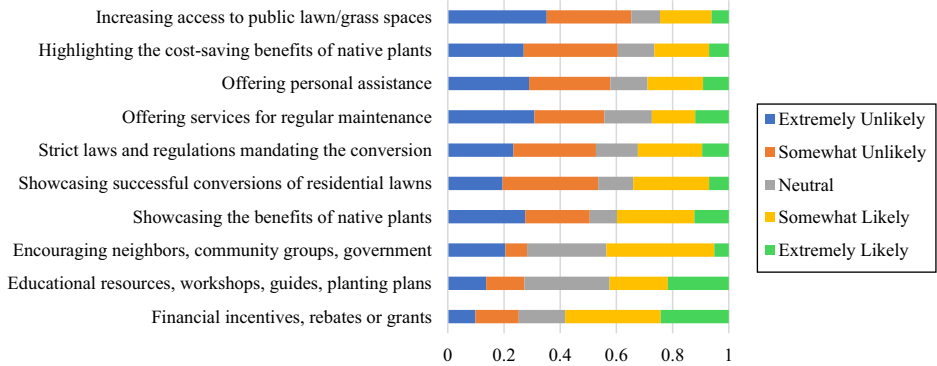
For the “likeliness to convert lawn to native” survey question, participants falling into the “very likely, likely” category or the “very unlikely, unlikely” category (Figure 9) were asked to elaborate on the reasons behind this motivation.

Participants likely to convert portion of lawn to natives: Participants are inclined to convert their lawns into native plantings for several reasons. The primary motivation for many is the biodiversity benefits that native plants offer, such as attracting bees and birds and supporting local ecosystems. There is a strong appreciation for the beauty and suitability of native plants in New Zealand’s climate. Ease of maintenance and a desire to decrease reliance on lawns due to environmental concerns are also drivers. Some individuals are gradually transitioning to native backyards, even if their partners are more hesitant, while others aim to control invasive weeds in bushy areas by replacing them with native species. Many find lawns uninteresting and are looking to create more visually appealing backyards. Personal preferences for native aesthetics, lower maintenance and environmental consciousness are common factors motivating people to convert their lawns into vibrant native landscapes.

Participants unlikely to convert portion of lawn to natives: Participant’s reluctance to convert lawns to native plantings can be categorized into several themes. One theme revolves around the recreational and practical use of lawns, where some prioritize having lawns for children and pets to play on, while others find lawns suitable for maintaining visibility, amenity value or for vegetable gardening. Another theme centres on scepticism and alternative solutions; some individuals express doubts about the emphasis on native plants, citing concerns about deforestation and the need for larger-scale reforestation efforts. Property and space constraints form another theme, with terraced backyards, rocky terrain, small lawn sizes and plans to sell properties contributing to the decision not to convert lawns. Personal preferences for colourful, flowering plants, concerns about plant suitability for specific climates and age-related factors also influence decisions. Limited interest or knowledge in native plantings, property safety considerations, the need for pet-friendly spaces, future plans and already completed landscaping projects round out the various themes that shape individuals’ choices regarding lawn conversion. These diverse factors highlight the very personalized nature of landscaping decisions.

4.4 Factors to increase the likelihood of backyard conversion to natives

The effectiveness of various incentives and strategies for promoting lawn-to-native conversions varies among respondents. Financial incentives, rebates or grants are viewed most favourably, with 58.2% of respondents finding them somewhat or extremely likely to drive conversions (mean score: 1.53) (Figure 16). In support, the general comments from



Source: Authors' own work

Figure 16. Likelihood of strategies to incentivize participants to convert a portion of their lawn to natives

participants highlight significant barriers to adopting native planting, including physical limitations, costs and the availability of affordable native plants. These practical challenges suggest a need for targeted support, such as subsidies for native plants or assistance programmes that make native planting more accessible. Educational resources, workshops, guides and planting plans also have a positive influence, with 52.0% of respondents indicating they are somewhat or extremely likely to be effective (mean score: 1.77). Education and awareness emerged from the survey as critical needs, with many respondents expressing a desire for more information on the benefits of native plants and guidance on selecting and maintaining appropriate species. Addressing these knowledge gaps through educational campaigns, workshops and readily available resources could empower homeowners to make informed, sustainable decisions. Encouraging neighbours, community groups and government initiatives is seen moderately positively (mean score: 2.00). Showcasing the benefits of native plants and successful conversions of residential lawns are viewed somewhat positively (mean scores: 2.26 and 2.32, respectively). Strict laws mandating conversion and highlighting cost-saving benefits have a moderate influence (mean scores: 2.34 and 2.54, respectively). The participant discussion around the role of policies and regulations in promoting native plant landscaping underscores the need for broader systemic support. While individual actions are crucial, coordinated efforts at the community or governmental level, such as implementing regulations to control invasive species or offering incentives for native planting, can provide the necessary framework to support widespread adoption of native species in urban landscapes. Despite this, offering maintenance services and personal assistance are seen positively by only a portion of respondents (mean scores: 2.47 and 2.49, respectively). Increasing access to public lawn spaces is considered the least effective incentive (mean score: 2.70).

Integrating backyard practises into policy is important to address future crises while avoiding exacerbation of health inequalities (Kingsley *et al.*, 2023). Furthermore, a proper management system should be emphasized for urban backyards to improve living standards in cities (Sivam *et al.*, 2012). However, the results indicate that financial incentives, such as rebates or grants, are perceived as the most effective strategy for promoting lawn-to-native conversions. This suggests that direct economic benefits may serve as a strong motivator for homeowners, potentially overcoming financial barriers associated with converting lawns to

native plantings. The favourable view of educational resources, workshops and guides also highlights the importance of increasing awareness and knowledge among homeowners.

The moderate support for community-driven initiatives and showcasing successful examples reflects a community-oriented approach where social proof and collective action play a role in influencing individual decisions. However, the relatively lower effectiveness of stricter regulatory measures and maintenance services indicates that while homeowners may respond well to voluntary and supportive measures, more coercive approaches may be less effective. Interestingly, the least effective strategy, increasing access to public lawn spaces, suggests that the availability of alternative green spaces does not significantly influence the decision to convert private lawns. This may indicate a strong preference for private ownership and control over one's backyard environment, reinforcing the need for strategies that directly target individual homeowners rather than relying on broader public infrastructure changes.

4.5 Insights into results and practical implications

The findings from this study provide actionable insights for designing policies and initiatives that effectively promote the conversion of lawns to native plantings, enhancing both ecological health and homeowner satisfaction in urban environments.

Firstly, the strong correlation between backyard health and happiness suggests that initiatives focusing on improving backyard conditions can have a dual benefit: enhancing homeowner satisfaction and fostering healthier urban ecosystems. Programmes that encourage regular interaction with and maintenance of backyards, particularly through the incorporation of native plants, can be highly effective. Homeowners are motivated by various factors such as attracting wildlife, enhancing the aesthetic value of their outdoor spaces and creating functional areas that offer privacy and shade. By aligning programmes with these motivations – such as through the promotion of native plants that support local wildlife or provide natural beauty and shade – initiatives can more effectively encourage native landscaping.

The analysis also highlights the importance of targeting specific demographic groups, particularly younger individuals and those from Māori and Pacific backgrounds, who are more inclined to adopt native landscaping. Tailored outreach that resonates with the cultural values of these communities, coupled with financial incentives such as grants and rebates, can lower the barriers to conversion. Financial incentives are particularly crucial in addressing the economic challenges that many homeowners face, making the transition to native plantings more feasible. The favourable view of financial incentives, as shown in the study, underscores their potential as a strong motivator for change, especially when combined with educational resources that build homeowners' knowledge and confidence in maintaining native species.

The study reveals that practical considerations, such as ease of maintenance, suitability for local climates and the long-term benefits of native plantings for ecosystem health, are key drivers for homeowners. Thus, educational programmes that provide workshops, guides and planting plans can complement financial incentives by equipping homeowners with the tools and information they need to succeed. This approach not only addresses the challenges of limited knowledge and accessibility but also taps into homeowners' desire for sustainable and low-maintenance landscaping options.

Community-driven initiatives and showcasing successful conversions also play a role in fostering a sense of collective responsibility, which can further motivate individual homeowners. However, the relatively lower effectiveness of stricter regulatory measures and the preference for voluntary and supportive strategies suggest that policies should focus on encouragement

rather than coercion. The study's findings also indicate that increasing access to public lawn spaces is less effective as an incentive, suggesting that efforts should prioritize enhancing private backyard environments. Homeowners prefer the control and personalization that comes with private backyard spaces, where they can implement native landscaping tailored to their specific needs and preferences. Practical considerations such as slope stability, temperature regulation and soil suitability are critical in these decisions.

By emphasizing the personal and ecological benefits of native plantings, and by providing support that addresses individual preferences and challenges – such as physical limitations, cost concerns and the availability of affordable native plants – policymakers can create a more conducive environment for widespread adoption.

5. Conclusion

Encouraging native planting not only supports urban biodiversity but also contributes to the aesthetic and practical value of urban backyards, making it a sustainable practice for urban living. The study answered the research question: *How can native planting coverage in homeowners' backyards be increased?* By investigating the motivations and barriers that New Zealand homeowners face in planting native species, this research provides insights into increasing ecological sustainability through urban planting. The survey highlighted that younger homeowners and those less satisfied with their current backyards are more likely to convert their lawns to native plantings. In addition, Māori and Pacific homeowners showed a higher motivation towards native landscaping. Another result revealed that time spent maintaining native plants significantly enhances backyard health and backyard happiness.

The findings of this study provide clear, actionable insights for developing effective policies and initiatives to promote the conversion of lawns to native plantings. The strong correlation between backyard health, happiness and native plant coverage highlights the dual benefits of focusing on backyard improvements: these efforts not only boost homeowner contentment but also contribute to healthier urban ecosystems. By aligning programmes with the motivations that drive homeowners – such as attracting wildlife, enhancing aesthetics and creating functional outdoor spaces – these initiatives can more effectively encourage native landscaping. Furthermore, targeting specific demographic groups, particularly younger individuals and those from Māori and Pacific backgrounds, is crucial. Financial incentives and educational resources emerged as likely the most effective strategies to encourage native planting. Thus, tailored outreach that resonates with the cultural values of these communities, combined with financial incentives, can significantly lower barriers to conversion.

Practical considerations such as ease of maintenance, suitability to local climates and the long-term ecological benefits of native plantings are key drivers for homeowners. Community-driven initiatives and showcasing successful conversions can foster a sense of collective responsibility, further motivating individuals. However, the preference for voluntary, supportive measures over regulatory approaches suggests that policies should focus on encouragement rather than regulation. Finally, the study indicates that efforts should prioritize enhancing private backyard environments over public lawn spaces, as homeowners prefer control and personalization in their outdoor spaces. By addressing both personal and ecological benefits, and by supporting homeowners with the necessary resources, policymakers can create an environment conducive to widespread adoption of native plantings, leading to more sustainable and biodiverse urban landscapes.

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Appendix. Survey questionnaire: planting behaviours and attitudes of homeowners

What is your age?

18-25 years old	26-40 years old	41-65 years old	66-80 years old	81 years or older
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What is your gender?

Male	Female	Non-binary / third gender	Prefer not to say
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What is your education? (Check all that apply)

Less than high school	High school	Technical course or trade	Professional course	Undergraduate degree
Post-graduate degree	Professional degree	Doctorate	Other (please specify):	

What best describes your past and present career/occupation? (Check all that apply)

Trade	Office/administration/management	Creative industry	Self-employed	Full-time caregiver
Unemployed	Retired	Other (please specify):		

What is your yearly household income?

0-\$40,000	\$41,000-\$80,000	\$81,000-\$120,000	\$121,000-\$160,000	\$161,000-\$200,000
\$201,000-\$240,000	\$241,000-\$280,000	\$281,000+	Prefer not to say	

What is your ethnicity?

Māori	Pacific Peoples	NZ European	Other European	Asian
Middle Eastern/Latin American/African	Other (please specify):			

Backyard Vegetation (Use sliders or check 'Not sure')

	0%	20%	40%	60%	80%	100%	Not sure
% of backyard with vegetation when purchased							
% of vegetation that was native to NZ							
% of backyard currently with vegetation							
% of current vegetation that is native to NZ							

When planting vegetation, which factors are important to you? (Check all that apply)

To provide shade	To provide privacy	To block noise	To attract birds	To attract bees/insects
To produce herbs/vegetables	To produce fruit	To add colour	To create beautiful outdoor spaces	To support native biodiversity
Other (please specify):				

When choosing to plant or remove vegetation, how important is it whether it is native or exotic?

I prefer native species	I prefer exotic species	I don't consider this. I have no preference	I do consider this. I like both native and exotic, for different reasons
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Select the maintenance option that applies.

I/we maintain our own backyard	I/we pay for someone else to do the maintenance	I/we pay for some maintenance, and do some ourselves	No maintenance is carried out by me or anyone else	Other (please specify):
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What % of this time is spent on maintaining lawns, native, and exotic species?

Lawn	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
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Native species										
Exotic species										

What is the general health of your backyard?

Very healthy	Moderately healthy	Moderately unhealthy	Very unhealthy	I'm not sure
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How much time do you spend in your backyard compared to public outdoor spaces?

None at all	A little	A moderate amount	A lot	A great deal
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How happy are you with your backyard?

Extremely unhappy	Somewhat unhappy	Neither happy nor unhappy	Somewhat happy	Extremely happy
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How likely are you to convert a portion of your lawn to native planting?

Extremely unlikely	Somewhat unlikely	Neither likely nor unlikely	Somewhat likely	Extremely likely
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Which factors would increase your likelihood of converting a portion of your lawn to native planting?

Factor	Definitely yes	Probably yes	Might or might not	Probably not	Definitely not
Offering financial incentives (rebates/grants)					
Providing educational resources (workshops, guides)					
Showcasing successful conversions of residential lawns					
Encouraging community-wide shifts (neighbors, groups, government)					
Enforcing strict laws/regulations					
Highlighting cost-saving benefits (reduced water usage, maintenance)					
Showcasing benefits of native plants (wildlife support, air/water quality improvement)					
Offering personal assistance (consultation, implementation)					
Offering services for regular maintenance					
Increasing access to public lawn/grass spaces nearby					
Other (please specify):					

Source: Authors' own work

Corresponding author

Megan Burfoot can be contacted at: mburfoot@aut.ac.nz