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Intersectional vulnerabilities in climate change adaptation: challenges of integrating them into urban planning in Vienna

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ABSTRACT

Urban heatwaves have a significant impact on cities due to their density and the scarcity of green and blue spaces. Public green and blue spaces (PGBS) play a crucial role in mitigating these negative consequences. To counter these socio-spatial inequalities, urban planning plays a crucial role in increasing the availability of PGBS near their living areas. This paper examines how women's intersectional heat vulnerabilities are addressed in climate adaptation and urban planning, using Vienna as a case study, given its long-standing commitment to gender mainstreaming and climate-sensitive planning. Drawing on environmental justice and intersectionality perspectives, we employ a mixed-methods approach: an assessment of the socio-spatial distribution of inequalities in Vienna and a qualitative assessment aimed at understanding how women are considered within the planning decision-making process. The results identify spatially distinct overlaps between areas with high concentrations of intersecting vulnerabilities of women and low levels of PGBS for priority areas. Within policy documents and semi-structured interviews, a wide range of strategies exists to reduce social inequalities. However, the links between existing policy instruments to reduce negative impacts for women by providing more PGBS are few and weak. Providing PGBS for vulnerable women to increase spatial justice is not prioritised, but is, on the contrary, often ignored and excluded from urban planning across the globe. Even the frontrunner example of Vienna struggles to tackle this challenge in the interests of climate justice.

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Vulnerability; resilience urban heat island; climate change; climate change adaptation; urban planning; intersectionality

1. Introduction

2024 was the warmest year globally since records began in 1850 (NOAA 2025). Not only is the number of days of heatwaves per year increasing due to climate change, but the intensity of these heatwaves is also rising (Friesenecker et al. 2025; IPCC 2023; Martinez-Villalobos et al. 2025). In particular, cities are struggling with the consequences of

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rising temperatures and the associated urban-heat island effect, leaving more people exposed to urban heat due to urbanisation associated with increasing infrastructure development pressures, which leads to land sealing at the expense of public green and blue spaces (PGBS; Kapeller et al. 2024; Kim and Brown 2021; Pace et al. 2025; Reinwald et al. 2024; Santamouris 2007; 2014; Zuvela-Aloise, Hahn, and Hollosi 2025).

Urban overheating has both direct and indirect impacts on the economy and infrastructure, as well as on people's health and quality of life (Diem et al. 2024; Telesca et al. 2018). Heat-related health and social consequences affect everyone, but not to the same extent (Diem et al. 2024; Friesenecker et al. 2025; Limaye 2023; Seebauer et al. 2024). The extent to which individuals are affected by heat is influenced by various factors, including individual health conditions, social positions shaping coping and adaptive capacity, and institutional support (Bolitho and Miller 2017; Filho et al. 2018; Foshag et al. 2024; Zehra Zaidi and Pelling 2015). An effective response towards the increasing risk of urban heat is the provision of green and blue spaces, such as trees, wetlands, or green facades, among others (Cariolet, Vuillet, and Diab 2019; Endreny et al. 2025; Ettinger et al. 2024; Hintz et al. 2018; Pamukcu-Albers et al. 2021). PGBS are essential for their cooling capacity (Gunawardena, Wells, and Kershaw 2017), which is mainly provided by plants, especially (large-crowned) trees, through shading on the one hand and increased evapotranspiration on the other (Gillerot et al. 2024; Jones et al. 2022; Li et al. 2024).

However, PGBS are often unequally distributed throughout urban areas, as well as between urban areas, resulting in differentiated cooling capacities (Friesenecker et al. 2025; Han et al. 2023; Li et al. 2024; McDonald et al. 2024; Schell et al. 2020). These spatial inequalities intersect with socially stratified patterns of vulnerability that are unevenly distributed across populations and urban space. Social vulnerability is often defined based on socio-economic and demographic characteristics, such as income, age, gender, and single parenthood, among others (Balas et al. 2021; European Environment Agency 2022; Van Tol et al. 2024). However, it is essential to adopt an intersectional approach when considering these characteristics, rather than treating vulnerable population groups as homogeneous, as some experience multiple, overlapping disadvantages (Calderón-Argelich et al. 2023).

Women are frequently identified as disproportionately affected by extreme heat. Empirical studies show that heat-related mortality and health risks are higher among women than men (Ballester et al. 2023; Ellena, Breil, and Soriani 2020). Importantly, women are not more vulnerable than men per se (Tschakert and Machado 2012); rather, they are often affected by several intersecting vulnerability characteristics, including age, socio-economic position, housing conditions, and care responsibilities (Edvardsson Björnberg and Hansson 2013; Stone, Blinn, and Spencer 2022; Trahan, Walshe, and Mehta 2023). Excess heat-related mortality is disproportionately higher among women at older ages (Ballester et al. 2023). Furthermore, from a gender planning perspective, we know that women disproportionately bear higher burdens of unpaid caregiving responsibilities and reproductive work, making them more reliant on PGBS for everyday activities, care work, and thermal relief during heatwaves (Calderón-Argelich et al. 2024).

Accordingly, the article focuses on responses to and strategies addressing the heat-related vulnerabilities of women from an intersectional perspective. Consequently, the integration of heat-related intersectional vulnerabilities into urban planning and the relevance of heat-related spatial characteristics in decision-making processes at all policy

levels, ranging from strategic Heat Action Plans to the design of PGBS, remains challenging for local authorities. The aim of the paper therefore is (a) to assess how climate and urban policy consider women from an intersectional perspective in the context of climate change adaptation at different policy levels, (b) to analyse gendered and spatial inequalities in intersectional vulnerabilities among women in relation to the availability of PGBS, and (c) to assess how Vienna is taking women into account from a gender-sensitive perspective in its policy and planning decisions by providing more PGBS as a response to urban heatwaves. Vienna, the capital city of Austria, is selected as a case study due to its long-standing commitment to gender mainstreaming and climate-sensitive urban planning, making it a particularly relevant context for examining how intersectional heat vulnerabilities are addressed in policy and planning practice.

2. Conceptual framework

The paper adopts an intersectional perspective combined with spatial justice considerations related to urban heat risks. We draw on environmental justice research, which highlights how environmental burdens and benefits are distributed unequally, how decision-making processes include or exclude affected populations, and how specific experiences are recognised or ignored (Walker 2012). Adaptation to urban heat, therefore, raises justice implications, including which measures are prioritised, for whom those measures are designed, the timing of support provision by the public administration or communities, and the implementation process itself. Limited public financial resources further intensify questions of who gains and who loses in the adaptation process (Friesenecker et al. 2025; Walker 2012). In this context, the timing and prioritisation of interventions are especially important, as some areas usually receive risk-reduction measures earlier than others (Friesenecker et al. 2025). However, climate change adaptation policies often (re-)create environmental injustices by ignoring the specific needs of individuals (misrecognition), by disproportionately allocating PGBS to wealthier areas (uneven distributional effects), or by hindering participation processes (procedural injustice; Friesenecker et al. 2025; Thaler and Seebauer 2025; Wiering et al. 2025). Vulnerability in the context of climate adaptation is often used as a monolithic bloc, without distinguishing the different overlapping and intersecting forms of discrimination that individuals experience (Amorim-Maia et al. 2022; 2024; Hamsted 2023; Mikulewicz et al. 2023; Nielsen, Bonati, and Andersen 2023; Stein et al. 2024; Tschakert and Karthikeyan 2025). Intersectionality, therefore, shifts perspectives by enhancing our understanding of inequality and providing a more comprehensive answer to the question of who is vulnerable in relation to urban heat (Tschakert and Karthikeyan 2025). Going back to Crenshaw's (1989, 149) seminal work, she describes intersectionality as overlapping and situated as the following quote summarises:

> Black women sometimes experience discrimination in ways like white women's experiences; sometimes, they share very similar experiences with Black men. Yet often, they experience double discrimination – the combined effects of practices that discriminate based on race and based on sex.

While gender-sensitive approaches in planning often focus on improving women's and girls' access to public spaces (Sánchez de Madariaga and Roberts 2016), this study

prioritises the intersection with socio-economic disadvantage, as this consistently emerges as a key determinant of unequal exposure and adaptive capacity in the context of urban heat (Amorim-Maia et al. 2022). For example, some cooling solutions are unaffordable for many low-income households (Amorim-Maia et al. 2024; Tschakert and Karthikeyan 2025), However, in addition, we also focus on how these vulnerabilities intersect with age, health conditions, and migration status, reflecting further locally specific structural disadvantages related to inadequate and cramped housing conditions (Hamsted 2023; Mazzone et al. 2024; Tschakert and Karthikeyan 2025) as well as unpaid care responsibilities leading to differentiated needs for public green and blue spaces (Amorim-Maia et al. 2022; Calderón-Argelich et al. 2024). These multiple, intersecting inequalities may be made visible or invisible in adaptation policies (Tschakert and Karthikeyan 2025). In practice, urban planners and architects are not necessarily "blind" to these issues, but they often overlook further disadvantages caused by the provision of PGBS (Mazzone et al. 2024).

Gender planning and gender mainstreaming, understood as a strategy for integrating gender considerations into policy design at all stages, have become crucial institutional responses aimed at reducing gendered urban inequalities in recent years (de EIGE 2019; Sánchez de Madariaga and Roberts 2016). Some European cities, such as Barcelona, Vienna, and Paris, as well as several German cities, have made efforts to raise awareness of gender mainstreaming in urban planning processes, including PGBS (Calderón-Argelich et al. 2023; Huning 2020). Here, the use of gender mainstreaming led to a focus on planning processes instead of pure design principles, where checklists "mainstreamed" the realisation of barrier-free, accessible, and needs-based public spaces (including greening), recognising the needs of different groups in design, often specifically those of women and girls (Huning 2020; Sánchez de Madariaga and Roberts 2016). Furthermore, Calderón-Argelich et al. (2023) showed that, at least for the greening strategies they studied in the Global North, all aimed to ensure the availability and accessibility of green areas to all residents, while gender equity was only mentioned as a goal in Barcelona. A gender-sensitive approach to PGBS tends to focus more on the design of green spaces than on their spatial distribution in relation to intersectional vulnerabilities (Calderón-Argelich et al. 2023; Huning 2020).

Urban climate policy instruments are increasingly incorporated into urban policymaking. Regarding urban heat, local climate mitigation and adaptation strategies embedded within multilevel governance settings have not only become a major field of research, but also crucial policy tools (Kern 2023). Heat Action Plans have become one of the most important institutional responses to the effects of urban heatwaves (Kotharkar and Ghosh 2022; Tschakert and Karthikeyan 2025). As argued by Kotharkar & Gosh (2022), Heat Action Plans are currently the only policy framework that directly addresses heat-related vulnerabilities, providing effective policy tools at every spatial scale. However, Tschakert and Karthikeyan (2025) argue that Heat Action Plans tend to refer to "vulnerable groups" in somewhat broad categorisations, with catalogue-like mention of socio-demographic markers which mask the complexities of lived experiences and intersecting vulnerabilities. Moreover, these plans often fail to consider (a) the spatial dimension of vulnerability, including the role and distribution of PGBS that are typically addressed through urban development plans formulated by local planning departments (Kotharkar and Ghosh 2022), and (b) they also lack adequate integration of small-scale, spatially

explicit socio-economic information or include gender inequality (Calderón-Argelich et al. 2023; Chu and Cannon 2021).

3. Data and methods

To identify how and to what extent women from an intersectional perspective are taken into account in the context of climate change adaptation policies in relation to heat at local and European level, we use a mixed-method approach based on a three-step approach: step 1: policy document analysis, step 2: spatial assessment based on socio-economic variables and step 3: semi-structured interviews focusing on Vienna.

3.1. Study area: Vienna – a pioneer in climate - and gender-responsive urban planning

With a population of just over 2 million (as of 1 January 2024; Stadt Wien 2024a), Vienna is characterised by a high proportion of green and blue spaces, accounting for over 50% of the total city area (City of Vienna 2023). The preservation and development of these areas are governed by a green space concept (MA18 2014), to which district planning, as well as zoning and development plans, must adhere. Despite several urban development challenges and pressures in recent decades, such as population growth through immigration, socio-demographic diversification and changes in multi-level governance settings following EU accession, the city is actively preserving and renewing its PGBS (Kazepov and Verwiebe 2021). Aiming at providing high-quality PGBS for all residents, urban development plans and green space concepts focus on (a) continuing the protection of different landscapes of the cities green belt which has been under protection for over a century now with a mix, consisting of different landscapes such as the peri-urban forest areas in the North and West (Biosphere protected area of Wienerwald) and the Riverine Wetlands National Park (Nationalpark Donau-Auen) in the south-east to name the most important (see Breiling and Ruland 2008 for details). The city (b) also demands the creation of new parks and blue spaces in new urban development zones since the 1990s, initially based on issued urban development guidelines and since 2015 based on minimum standards, and (c) on street greening and park renovation/expansion in densely populated inner-city areas (Friesenecker, Thaler, and Clar 2024). Therefore, Vienna is considered a pioneer in public green space planning (Anguelovski et al. 2018).

However, like other European cities, Vienna is increasingly affected by the climatic influence of urban heat. Due to Vienna's location in the predominantly continental Pannonian east of Austria, both the city itself and its inhabitants are exposed to increasingly longer and more frequent heatwaves in addition to rising average temperatures. Over the recent decades, Vienna has experienced a more pronounced increase in average temperature, approximately 1.5°C above the global average, and the number of heat episodes (Kysely Days) for the period 1990–2020 has more than doubled compared to the 1961–1990 climate period (Orlik et al. 2025). Urban heat is particularly pronounced in central, densely populated areas, where tropical nights are higher due to the urban heat island effect (Friesenecker et al. 2025; Leyba et al. 2025; MA22 2015; Zuvela-Aloise, Hahn, and Hollosi 2025).

In response to this trend, the city administration has utilised public spaces in central areas and new developments for implementing climate change adaptation measures focused on reducing heat in recent years. Based on pilot projects, such as the "Cool Street – Neubaugasse" and the "Cool Square – Johann-Nopumuk Vogl Platz", where tree planting in combination with the sponge city principle, rainwater management, additional blue infrastructure (e.g. mist sprays) and other vegetation elements for shading and cooling were tested, approaches were mainstreamed and are implemented incrementally in other areas (Damyanovic et al. 2024). Furthermore, Vienna has developed and incorporated urban heat mitigation and management into various strategies (Leyba et al. 2025). Vienna aims to become a frontrunner city for climate change adaptation; however, it often fails to provide detailed information about funding and the timeline for reaching the goals to reduce the negative impacts of heat stress (Leyba et al. 2025). The government also lacks legal responsibilities to enforce the planting of new trees on privately owned land, except in the case of new urban developments (MA18 2014).

Vienna is also considered to be a role model for other cities in terms of gender-responsive urban planning and the integration of Gender Mainstreaming into urban planning and development (Calderón-Argelich et al. 2023; Huning 2020; Jackowska and Novas Ferradás 2023). The city has been actively involved in Gender Mainstreaming and Gender Budgeting for more than 25 years. In 1998, a Head Office for Everyday and Women-Friendly Planning and Building was established as part of the Municipal Directorate for Urban Planning. This office initiated over 50 pilot projects between 2005 and 2010, testing new approaches to gender-sensitive urban planning and further developed the gender-sensitive strategy of the city (see Irschik and Kail 2016 for details on some projects). This resulted in another key moment of institutionalisation of gender mainstreaming in planning in 2013, when a Manual for Gender Mainstreaming in Urban Planning and Urban Development focusing on how to consider gender mainstreaming in master plans and urban development concepts, in zoning, in the design of public and green spaces, and in housing, was released (Jackowska and Novas Ferradás 2023; Vienna City Administration 2013). Gender mainstreaming into urban planning has since then been practically applied in several urban planning stages, from master planning to the design of PGBS as documented by Zibell, Damyanovic, and Strum (2019).

3.2. Policy document analysis on intersectionality, heat, and PGBS within urban planning

The first step in our mixed-method approach was to conduct a broad policy analysis. As adaptation to climate change and intersectionality are cross-cutting issues (BMVIT 2018) and affect many levels and instruments of governance, an extensive range of strategic documents at the EU, federal, and local levels were analysed using MaxQDA. Then Vienna was analysed in more detail (Appendix A). In addition to laws and regulations, written policies, concepts, and reports were used to gain a comprehensive picture of the extent to which intersectionality is used as a keyword, and if specifically, women in the field of climate change mitigation and adaptation in conjunction with PGBS, are considered at the EU, national, and local levels. Here, we conducted a qualitative thematic analysis (Braun and Clarke 2006). This allows for a comparison of how heat, climate change adaptation, women, and PGBS are generally considered at different strategic

levels by various stakeholders/bodies, and, where considered, how they are related. To comprehensively cover the occurrence of women's needs in the documents, we also focus on gender and intersectionality as key terms.

3.3. Spatial assessment

A second step included a quantitative exploration of intersectional disparities in relation to the availability of PGBS. We collected available sex- and income-group-disaggregated data for census tracts as the spatial unit from Statistik Austria's wage and income tax statistics for the year 2019, as well as sex-disaggregated data for single-parent households, educational attainment categories, and country of birth categories. Low-income women serve as the primary indicator of intersecting socio-economic vulnerabilities to urban heat. Viennese women at risk of poverty spend their leisure time in parks and public green spaces more frequently, which is related to the potentially inadequate housing conditions, according to the Vienna Gender Equality Monitoring Report (Stadt Wien 2021). The income dataset also contains social transfer payments, allowing for the creation of further intersecting categorisations. Low-income women receiving retirement payments and women receiving care support payments were used to approximate intersectional vulnerabilities, potentially more sensitive to heat-related health risks. Women receiving payments in family and child support are used as a proxy for women with childcare responsibilities. Although treated here as a rather crude proxy, surveys in Vienna have shown that women use green spaces more frequently because of their childcare responsibilities (Stadt Wien 2021). Women with low educational attainment serve as another intersecting category capturing precarious labour market situations. This is particularly affecting women with a migration background from non-EU countries, who also bear a heavier burden of unpaid domestic work and caregiving responsibilities (Stadt Wien 2021). Hence, we specifically considered women who were born in third countries outside of the European Union. Lastly, women as single parents are considered a particularly vulnerable group because of precarious expense situations, a tight housing situation, and unpaid care and domestic work.

This selection allowed us to focus on the question of how far women are overrepresented in the selected dimensions of vulnerability. In doing so, for each of the above selected variables, we calculated the share of men and women and assessed the inequality (as shown in Table 1). Furthermore, we focused on identifying the areas in which vulnerable women are overrepresented in relation to the city-wide differences. In the spatial analysis, we calculated the location quotient (LQ) for six indicators: low-income women (with less than 20.000€ annual net income, which is roughly the poverty threshold line for Austria), low-income women receiving retirement payments, women receiving family and childcare support, single-parent women, women with compulsory-only education and women born in third countries. The location quotient is a simple descriptive technique in regional analysis that measures the concentration in subareas of the city in relation to the city-wide amount and concentration (Wheeler 2005). The formula is:

$$\mathrm{LQ} = \frac{\left(X_i \;/\; \sum \mathrm{X}_i\right)}{\left(N_i \;/\; \sum N_i\right)} * 100$$

Table 1. Intersecting variables and gender differences amongst selected vulnerability dimensions.

	Variable	% of Group	% of Men within Group	% of Women within Group
INCOME	Tax Payers	100,0	49,4	**50,6**
	Annual Net Income <= 10k €	14,3	46,9	**53,1**
	Annual Net Income between >10-20k €	26,1	42,4	**57,6**
	Annual Net Income between >20-30k €	28,8	48,5	**51,5**
	Annual Net Income between >30-40k €	16,2	53,4	46,6
	Annual Net Income between >40k €	14,7	61,3	38,7
AGE & RETIREMENT PAYMENTS	Retirement Payment Recipients	28,3	41,4	**58,6**
	Retirement Payment Recipients in Income Group <= 10k €	8,0	27,7	**72,3**
	Retirement Payment Recipients in Income Group >10-20k €	33,3	33,4	**66,6**
	Retirement Payment Recipients in Income Group >20-30k €	32,1	43,5	**56,5**
	Retirement Payment Recipients in Income Group >30-40k €	16,7	51,3	48,7
	Retirement Payment Recipients in Income Group >40k €	9,9	56,2	43,8
CHILDCARE & HEALTH	Transfer Receivers	33,6	42,1	**57,9**
	Unemployment Payment Recipients	9,3	60,4	39,6
	Social Security Payment Recipients	5,2	58,1	41,9
	Family Support Payment Recipients	14,5	25,3	**74,7**
	Children Support Payment Recipients	2,1	25,7	**74,3**
	Care Benefit Payment Recipients	5,8	35,7	**64,3**
	Other Transfer Payment Recipients	10,3	46,3	**53,7**
MULTIPLE VULNERABILITIES	Single Parent Households*	9,7	16,9	**83,1**
EDUCATION	Residents aged older than 15 years	100,0	48,4	**51,6**
	Compulsory-only Education	25,4	47,6	**52,4**
	Basic Vocational Education	20,8	57,7	42,3
	Upper Secondary Qualification	29,6	44,9	**55,1**
	Tertiary Education	24,2	45,5	**54,5**
COUNTRY OF BIRTH	Total Number	100,0	48,8	**51,2**
	Austria	61,1	48,9	**51,1**
	EU member states and EFTA	14,3	46,8	**53,2**
	Non-EU member states	24,7	49,9	**50,1**
	EU member states after 2004	9,1	45,0	**55,0**
	Ex-Yugoslavian Countries	8,1	48,3	**51,7**
	Other European Countries	3,1	37,5	**62,5**
	America	1,0	45,6	**54,4**

*The share of Total Single Parent Households is related to private households. The share of educational levels is based on residents aged 15 years or older, and the country-of-birth categories refer to the total population. All others are shares from the total amount of Wage and Income taxpayers. Source: Statistik Austria for Income, Transfer and Retirement data based on Integrated wage and income tax register, Educational Attainment and Country of Birth; MA23 – for Household Data; own calculations.

where Xi represents the number of women in the subgroup in a census district i, divided by the sum in all census districts. Ni is the sum of men and women in the given subgroup.

If the value is above 100, a higher concentration, i.e. an overrepresentation of women in each census district, compared to the city-wide distribution. This measure is used to identify priority areas for greening interventions where gendered inequalities are most pronounced. It is based on the "Intersectional Vulnerability Inequality Score", defined as the arithmetic mean of the LQs of all six variables.

To analyse the relationship between the LQs of each group/the overall score and its exposure to PGBS, we performed a bivariate local Moran's I analysis in GeoDA to assess whether census districts with under- or overrepresentation of intersecting vulnerabilities (LQs) were surrounded by high or low amounts of green (Anselin, Syabri, and Kho 2006). After performing the analysis with several spatial weights (from low to high), we settled on 25 k-nearest neighbours as a middle ground to explore the spatial relationship between the overrepresentation of intersecting vulnerabilities and their exposure to surrounding green spaces. Green spaces were classified in two ways to differentiate the availability of nearby green spaces for everyday usage but also for their cooling effect: (a) green urban and blue areas defined as public parks, cemeteries, outdoor sports and leisure facilities, and water bodies; and (b) as forests and grassland which represent the large, nature-protected areas exerting a considerable cooling function and no direct day-to-day usage function. Data preparation followed Kabisch et al. (2016): green spaces were buffered by 250 m in QGIS and intersected with census tracts. Then the square metres of those areas, to approximate the green space's cooling intensity (Soltanifard and Amani-Beni 2025), were summarised using a spatial join. For census tracts that were not fully covered by buffers, accessible green space was weighted by the buffer area's proportion of the census tract's total area to account for less accessible green space and its reduced cooling intensity. The tree inventory was restricted to street trees and aggregated at the census tract level. Street tree density was then calculated as the number of street trees per tract divided by the total street length and multiplied by 100. Data were taken from the actual land use mapping and the public tree inventory of Vienna (Stadt Wien 2024a; 2024b).

3.4. Semi-structured interviews

The results of the policy analysis and mapping were analysed quantitatively, and key statements were clustered and summarised qualitatively. Based on these initial results, semi-structured interviews of approximately one hour were conducted in German in March and April 2024 with experts on PGBS in various departments, including the Urban Planning Department, Architecture and Urban Design, Environmental Protection, Vienna City Gardens, Urban Development and Planning (Appendix B). The interviewees were selected based on their knowledge of climate change adaptation, gender planning, and the provision of PGBS. Eight interviews (two men and six women) were conducted face-to-face; one interview took place online. The interviews focused on the interplay between climate, PGBS, and gender in Vienna's urban planning. These interviews aimed to obtain in-depth information on how gender-sensitive and intersectional perspectives on women in the field of heat and PGBS are addressed in practice by the public administration. How (strongly) are existing policies implemented in practice? How are the issues of (different) women, heat, and PGBS viewed as a whole/as an intersection? Are the needs of Vienna's women addressed in practice? It was also determined where and how experts from the public administration see potential for integrating these issues more effectively and in combination in practice.

Five thematic blocks formed the basis of the interviews, weighted differently depending on the interviewee: (i) Consideration of the three thematic fields (heat, PGBS, and gender) in the current sphere of work/urban planning in Vienna (ii) Strategic planning:

Consideration of the three thematic fields in Vienna in the past (iii) (Operational) planning of PGBS in the current practice (iv) Possible integration of the three thematic fields in the future at municipal and city level: existing knowledge, added value of joint consideration (v) Challenges of integrating the combination of the three thematic fields.

The interviews were transcribed in the original language. Then, a deductive coding scheme based on the literature was employed, following the same coding scheme used for the policy documents in step 1. The main themes were: (a) strategic urban planning in terms of gender/gender planning; (b) ensuring the implementation of PGBS; (c) role of intersectionality within the planning process; (d) impact of climate change to vulnerable groups; (e) including gender planning in the prioritisation of the implementation of PGBS; (f) urban governance arrangements; and (g) usage of economic policy instruments to encourage the implementation of PGBS in Vienna.

4. Results

4.1. Policy strategy on integrating gender into climate change adaptation and providing PGBS

Viennese urban policy is embedded within multiple political levels, including the EU and the national level. Policy strategies developed at higher political levels can provide strong direction and impetus for development and implementation at the local level. At the same time, however, the Austrian federal system allows Vienna greater room for manoeuvre to prioritise different political goals and strategies.

Viennese urban policy is embedded within multiple political levels, including the EU and the national level, which provide important strategic direction for local implementation. At the same time, Austria's federal system allows Vienna considerable autonomy to prioritise its own political goals. However, policy document analysis shows that Vienna aligns closely with European and national strategies. Vienna follows the European Strategy on Adaptation to Climate Change, published in 2013 and updated in 2021, as well as in the EU Green Deal (European Commission 2013; 2021a; 2021b), where cities are encouraged to implement large-scale PGBS to address climate-related risks, such as flooding or heat waves. It also follows the national adaptation strategies developed by the Austrian government, which encourage the implementation of PGBS (Austrian Government 2024).

Additionally, Vienna is committed to the UN 2030 Agenda for Sustainable Development, the Sustainable Development Goals (SDGs), and the UN Paris Agreement on Climate Change. Vienna has developed a range of strategies to address these commitments. Furthermore, in terms of climate policy instruments, the Smart City Climate Strategy (Deistler and Homeier 2022) serves as the overarching strategy, setting long-term goals across three fields of action: Climate Mitigation, Climate Adaptation, and the Circular Economy. The Vienna Climate Guide (Vienna City Administration 2022a) refines and specifies goals and defines the measures and instruments for implementing them. In summary, it outlines the common path towards a climate-friendly city, including measures on climate change mitigation and adaptation. In relation to the latter, it specifies five priorities: (a) protection from negative health impacts, (b) preservation and strengthening of green and recreational spaces, (c) climate-adapted and resource-

friendly urban structures, (d) climate-sensitive design of buildings and public spaces, including the specific needs of vulnerable groups, and (c) climate-resilience of public infrastructure and services.

Another key policy strategy is the Vienna Heat Action Plan, implemented in 2022. The Heat Action Plan outlines heat-related objectives and measures, with a primary focus on emergency actions to enhance public health, particularly for vulnerable groups, in response to heat impacts (Vienna City Administration 2022b). The Heat Action Plan contains long-term and short-term/seasonal measures detailing whether they are targeted at the population as a whole or at ten specific vulnerable groups, such as elderly residents, residents in care or with health issues, pregnant women, children, and low-income residents. Short-term measures across all target groups (for all) include, for instance, installing cool spots (shaded and water-cooled spots) at strategic sites in public spaces, or installing benches at already shaded sites. The Heat Action Plan focuses on short-term measures, while long-term measures are listed among the measures coordinated within existing urban planning procedures, but without any detailed information, such as quantified target goals.

In this respect, Urban Development Plans, released every ten years, serve as the most important strategic guidelines. These plans usually also include specific thematic concepts; the most important concerning the implementation of PGBS is the Thematic Concept on Green and Open Spaces. Additionally, a specific Urban Heat Island Strategy has been in place since 2015 (MA22 2015). All of the above, together with the Viennese climate policy instruments, focus on the provision of PGBS. The Urban Heat Island Strategy focuses additionally on private properties, such as residential and non-residential buildings. Providing PGBS were originally framed by the administration to support liveability through social and health benefits, whereas, under the Urban Heat Island Strategy, they have been reframed as key tools for adapting to the consequences of climate change. Nevertheless, planning PGBS do not prioritise the living areas of vulnerable groups, as defined in climate policy instruments, e.g. the Heat Action Plan. A previous Urban Heat Vulnerability Assessment of Vienna produced a Climate Vulnerability Map in 2019, identifying heat hotspots, areas with little greenery and water, and locations with a high proportion of age-related heat-vulnerable population (ECOTEN Urban Comfort 2019). However, Urban Development Plans do not include a strategic spatial prioritisation of PGBS development.

Further, our policy analysis found that women are mentioned explicitly in some strategic documents and implicitly in many others through references to “equity”, “gender equality”, or “gender-sensitive planning”. In this respect, the “Gender Manual” from 2013 (Vienna City Administration 2013) continues to serve as the basis for the daily strategic work of the Vienna City Planning Department, providing quality assurance for a gender-sensitive (gender-, age-, and group-specific) approach in planning processes at various levels. Therefore, the tool of Social Space Analysis is increasingly being utilised in urban planning processes (MA18 2012; Saptscheck & Wolf-Ostermann 2016). It primarily focuses on social and spatial justice, as well as the suitability of the city for everyday use (“Alltagstauglichkeit”), and PGBS with a specific gender-sensitive perspective (Damyanovic et al. 2021). However, none of the documents analysed highlight the specific importance of PGBS for women and girls in the context of climate change adaptation, especially with the request to prioritise the implementation of PGBS for women, nor to

implement an intersectional perspective on climate change adaptation. Yet, according to the Vienna Gender Equality Monitor, women are clearly overrepresented in the most vulnerable groups mentioned in climate policy documents, namely, the elderly and those on low incomes (Stadt Wien 2021).

4.2. Unequal spatial distribution of intersecting vulnerabilities of women and availability of PGBS

An assessment of gendered inequalities indicates that women are overrepresented in selected vulnerable groups. While men and women are almost equally present among all income taxpayers, women are generally overrepresented among the lower income groups (see Table 1 – Income dimension, highlighted in orange). This overrepresentation suggests a more limited individual economic autonomy among women. Clearly, this is an approximation, as we do not have data on household income situations.

Focusing on elderly populations, who are particularly sensitive to urban heat, Table 1 shows that women are generally overrepresented, accounting for 58.6% of receivers of retirement payments. This overrepresentation becomes even more pronounced when looking at the two lowest income groups, in which women are clearly overrepresented (72.3% and 66.6%). Using receipt of care benefits as a proxy for greater health-related sensitivity to heat, women are also overrepresented, accounting for 64.3% in this category. Focusing on family and child support payments as a proxy for women's predominant role in childcare, Table 1 indicates that women are clearly overrepresented (about 75%).

Single-parent households are another vulnerability dimension marked by multiple risk factors, with women being the most overrepresented by comparison with other indicators. In educational terms, women show a slight overrepresentation in compulsory-only education (52.4%), while they are also overrepresented in higher educational levels. Regarding migrant background, the overrepresentation is not pronounced, nor is it relevant for residents born in non-EU member states, except for some selected country groups, which are selectively displayed in Table 1.

Secondly, we present results on spatial patterns of selected vulnerable groups, in which women are overrepresented using the Locational Quotient (Appendix C), and relate these patterns to three types of green spaces: green urban areas, forests, and trees (Appendix D). The results of the Bivariate Moran's I analysis suggest that single indicators of intersectional vulnerabilities among women in relation to different types of green spaces follow a similar spatial pattern of gendered inequalities (Appendix E). Figure 1 summarises cluster categories of the Bivariate Moran's I analysis performed for the location quotients of the Intersectional Vulnerability Inequality Score in relation to the surrounding number of green spaces and trees.

The results show that in most central areas, we can find either High-Low clusters, indicating a relative spatial overrepresentation of higher intersectional vulnerabilities among women compared to men and relative to the number of forests and meadows, or Low-Low clusters, indicating that both values are low (Figure 1, Map A). This indicates that natural environments as cool-air generators and higher gendered inequalities are lacking in Vienna's densely built-up areas.

When it comes to Green Urban Areas (Map B), the analysis reveals a larger High-Low cluster in central districts (5-8) and in the north-eastern parts of District 21. Some

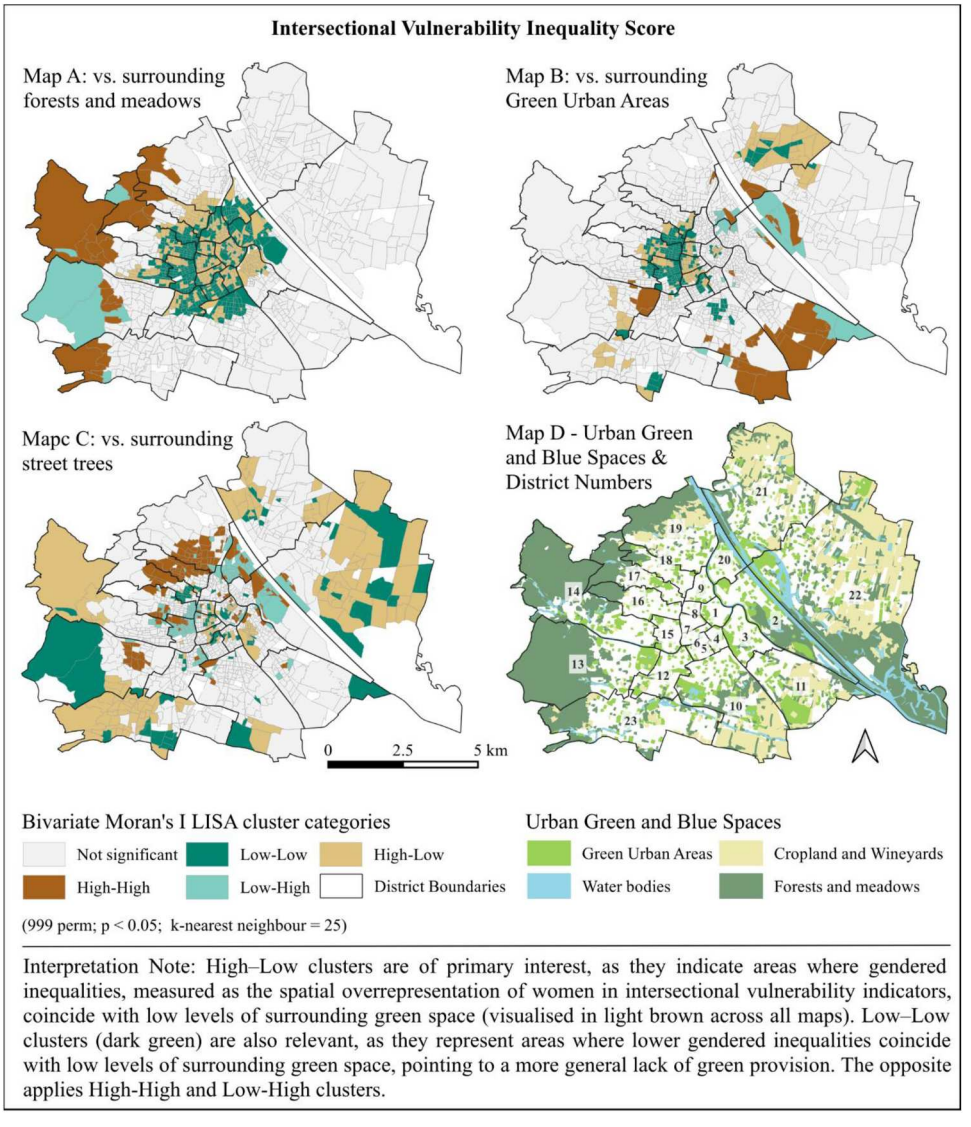

Figure 1. Bivariate Cluster Maps between the location quotient of intersecting vulnerabilities of women and the surrounding green. Own calculations. Sources: Statistik Austria & data.wien.gv.at.

additional smaller clusters exist in District 1, as well as in the still densely built-up areas of the western Districts of the city (15-18), which are surrounded by Low-Low clusters, and around certain areas in the southwestern parts of the City. From an intersectional vulnerability perspective, these areas are characterised by relatively higher gendered inequities in vulnerability indicators while lacking adequately sized urban parks that cater to the relative over-representation of vulnerable women who require green spaces due to higher caregiving responsibilities.

When it comes to street trees, smaller clusters where relatively higher gendered inequalities coincide with lower street tree availability are located in the central,

densely built-up parts of the city, mainly in parts of District 1 and Districts 3–8 (Figure 1, Map C). In contrast, large clusters with limited street tree availability at the outskirts of Vienna coincide with lower heat loads, where street trees may be compensated for by private gardens, agricultural land, or forests.

Across all three types of green space, the results consistently point to the most central districts (3-8) where higher gendered inequalities in intersectional vulnerability indicators coincide with lower levels of green provision, identifying these areas as priority locations for targeted greening interventions, particularly through Green Urban Areas and street trees, to help mitigate gendered inequalities.

4.3. Vienna expert's view on gender planning and provisioning of PGBS

One key finding that the analysis of the interviews reveals is a general awareness of the importance of considering women in urban planning. Across all interviews, although never explicitly stated, an intersectional perspective was taken. However, there is a recurring emphasis on age. Specifically, the focus is on young children and teenagers, with the needs of girls deemed especially important, enabling mothers, who are often portrayed as still bearing most caregiving responsibilities, to use PGBS near schools and at home. In contrast to young people, city officials distinguish elderly people as a specific target group, where women are again overrepresented and clearly have other needs, e.g. reduced mobility possibilities. Although low-income and migration background are mentioned by most interviewees (I1, I2, I3, I6, I7, I9), they are not as clearly articulated as the previous intersectional categories.

One major contributing factor to this awareness is the implementation and application of the Gender Manual, introduced in 2013, as well as Vienna's active commitment to integrating gender considerations across all levels of urban planning (I1). However, the extent to which women are considered in urban planning and the specific stages at which this occurs vary significantly across departments, depending on their focus and area of responsibility. For example, by integrating gender considerations in strategic policy and planning frameworks in some units, and more practically in the design and implementation of PGBS projects in other units. Furthermore, one interviewee noted that the specific needs of vulnerable groups are often secondary to the daily work of street-level bureaucrats, and that their everyday needs are rarely addressed (I5).

At the level of strategic urban policymaking, increasing and longer heatwaves are recognised as a central problem for liveability and wellbeing, as was evident from the document analysis. However, vulnerable groups are only occasionally considered and broadly categorised (mainly in the Heat Action Plan), and women are not specifically addressed at all in relation to heat or any other climate risk. One argument presented is that heat is perceived as a general problem, a challenge that affects everyone equally (I5). Nevertheless, in strategic green space planning, the reasoning behind providing a basic amount of green space per capita in proximity to all residents is driven partially by an intersectional perspective, as those with caregiving responsibilities and women from low-income households cannot easily travel long distances to green spaces or the countryside (I1, I5, I9). However, the decision-making process for distributing PGBS does not prioritise women per se.

By contrast, at the level of design and construction of public parks, squares and streets, a different picture emerges. According to multiple interviewees (e.g. I1; I3; I6; I7; I8; I9), women's needs are being addressed in the Gender Planning Document. Here, the city must assess the needs either through a targeted focus on girls and (elderly) women (through interviews, surveys and participatory observation) or through inclusive planning approaches that aim to serve all population groups, which would include women. Inclusive planning increasingly takes place in the context of *ex-ante* social space analyses and participation processes, as well as explicit requirements for inclusive planning and, depending on the project, also for women, in design tenders (I1; I2; I3; I6; I7). This is summarised in the following quote, which underscores the commitment to inclusive urban design.

> "Gender has now become inclusion, which is actually even more comprehensive and involves everyone". (I7)

The Viennese gender planning manual (Vienna City Administration 2013) serves as a basis for considering gender roles and diverse needs in PGBS and specifies criteria for planning (e.g. park design guidelines, street greening guidelines; I7; I8; I9). Furthermore, the interviews explored whether and how the approach to gender issues in general and the consideration of women in the decision-making process for designing and implementing PGBS in Vienna have changed, given the increasing focus on urban heat and the need for climate change adaptation. Almost all interviewees noted that, since heat has become a central challenge for the city, attention to women's specific needs has decreased compared to the period following the publication of the Gender Manual (e.g. I2; I8). However, this shift is not perceived as problematic. Many believe that the issue of gender has evolved: women's needs are now deeply embedded and actively addressed within urban planning processes and, according to some municipal employees, no longer require separate emphasis (e.g. I5). Awareness and knowledge of gender planning, such as through specific completed modules or training courses, are also typically considered during recruitment processes for new staff (I1). Gender planning has become the norm in the planning decision-making process in Vienna.

Nonetheless, several interviewees (e.g. I1; I2; I3) expressed the need to constantly communicate the relevance of intersectional vulnerabilities of women to municipal departments to keep the sensitivity to their specific needs updated. According to I2, it may be worth examining whether explicitly naming vulnerable groups, such as women, rather than referring only to vulnerable attributes, would better ensure that their needs are comprehensively addressed. In the context of urban planning decision-making, the threat of urban heat islands is seen as a "booster" for enhancing the provision of more PGBS in Vienna. Owing to its perceived cooling function in combating urban heat, PGBS is receiving increased attention and recognition, not only from the public but also from politicians and a broad range of interest groups. However, it is emphasised that PGBS should continue to be recognised as important for social interaction and well-being, rather than solely for its climatic function; for example, by providing meeting places or reducing social isolation (I1; I5). Despite the emphasis on heat, the usability of these public spaces for daily life and their overall quality of stay remain core priorities in Vienna's planning agenda (I9).

> Even if the heat is suddenly gone, the two issues (PGBS, women) remain … if the heat suddenly stopped, if there were suddenly no more green and open spaces, or if no attention was paid to … women, then we would immediately have a problem on all three levels. (I1)

PGBS, as well as gender considerations, form foundational elements of Vienna's urban planning approach. However, they are not explicitly framed as "climate issues". The topic of heat has only been recently integrated into urban planning decision-making and policy debate as a central concern (I1). In recent years, awareness of the relationship between women and climate change adaptation has increased within the public administration (I1–I9). As a result, women are being more comprehensively addressed in city-level policy documents, as reflected in the ongoing revisions of the Vienna Climate Roadmap and the Heat Action Plan. However, the current formulations do not foresee any prioritisation of women, even less so in the form of an intersectional perspective, which represents a major shortcoming in the support provided by the public administration.

Urban planning instruments such as regulatory planning tools (e.g. zoning) or financial planning instruments (e.g. subsidies) do not include any references to women. This constitutes a critical gap for practical implementation and support within the decision-making processes of Viennese urban planning. Consequently, there is no spatial prioritisation oriented towards women's livelihoods. The public administration applies an "equal" distribution across districts, without considering differences in heat severity, exposure levels, or social vulnerability. As a result, vulnerable districts receive the same level of support as high-income districts. Also, in the design and construction of public spaces, everyday uses by women are not specifically addressed but are treated as "one need" equally relevant among many others. Yet the strategic anchoring of vulnerable groups provides valuable support for municipal experts when advocating climate adaptation measures at various administrative levels (I1).

5. Discussion and conclusion

Drawing on policy analysis, spatial data, and expert interviews, our study reveals a misalignment between how gendered intersectional inequalities in urban heat are addressed in policy, how they manifest spatially, and how they are translated into planning practice. It shows that Vienna has institutionalised the implementation of gender- and women-friendly everyday (urban) planning by consistently raising awareness through the Gender Manual since 2013. Gender-sensitive planning primarily focuses on ensuring inclusivity at all stages, from strategic and master planning to project implementation and PGBS monitoring. However, this attention does not explicitly extend to long-term climate adaptation or heat-related planning policies. This is highly problematic, as urban heat waves are not equally distributed across PGBS, and not everyone has the capacity to cope with and adapt to these impacts. In this context, urban planning plays a central role in reducing potential inequalities rather than exacerbating them (Garcia & Tschakert 2022; Seebauer et al. 2024; Friesenecker et al. 2025; Tschakert and Karthikeyan 2025).

Especially in the context of Vienna's park design projects, attention has been paid to multifunctional designs that address different user groups, with an explicit focus on the specific needs of women with caregiving responsibilities, girls, and elderly women, while considering them alongside other user groups. In contrast, climate change

adaptation, mainly the Heat Action Plan, focuses only on vulnerable groups in very broad categories driven primarily by health indicators, with mostly short-term measures targeted at these vulnerable groups, without changing anything at the urban design level. This occurs without explicitly referring to women, although they are clearly overrepresented among several vulnerability dimensions. This confirms Tschakert et al.'s (2025) critique of Heat Action Plans as lacking intersectional nuance and echoes earlier findings that socio-demographic vulnerabilities tend to be flattened in climate adaptation strategies (Kotharkar and Ghosh 2022).

Nevertheless, our quantitative analysis provides a clear indication that women are overrepresented in several vulnerable groups, particularly among low-income retirees, care-benefit recipients, and single-parent households. Furthermore, gendered inequalities in intersectional vulnerability indicators are unevenly distributed across the city. Results show a notable overlap between areas with higher gendered inequalities in intersectional vulnerability indicators and low levels of green infrastructure, especially in dense, central, and peripheral neighbourhoods. These findings align with the existing literature on the unequal distribution of PGBS in cities, which is often also shaped by different policy decisions, such as housing policy (Friesenecker et al. 2025; Han et al. 2023; Li et al. 2024; Schell et al. 2020). The use of bivariate cluster analysis reinforces this point by revealing clusters in which higher gendered inequalities coincide with lower green exposure, suggesting spatial priority areas for future greening measures that could mitigate gendered inequalities in intersectional vulnerability through targeted, improved spatial distribution of PGBS.

This misalignment can be explained by the fact that, while Vienna is a leader in integrating a gender-sensitive approach into urban planning (as noted elsewhere Anguelovski et al. 2018; Huning 2020), this integration is currently largely decoupled from climate policy instruments. Our results suggest that institutional awareness of gender-sensitive planning remains high in Vienna, particularly within urban planning and public design departments. There is a clear institutional memory of the importance of addressing women's needs in public space, and gender equity continues to influence the planning of PGBS through inclusionary practices. However, the findings also point to a shift: while inclusive planning has broadened conceptually to encompass all groups, specific attention to women has diminished somewhat in the face of more generalised frameworks towards diversity/inclusion. This resonates with a general dilemma of translating gender-sensitive planning into practical application in urban planning as identified by Huning (2020). However, Huning also cautions that the increasing reframing of gender planning as diversity-oriented planning may prioritise recognition and inclusion of different groups while weakening feminist critiques of labour-market disparities and the unequal distribution of care, which are central to gender justice. Jackowska and Novas Ferradás (2023) demonstrate further that Vienna's pioneering gender-sensitive planning emerged and was institutionalised before the widespread uptake of intersectionality in planning and policy debates. Consequently, intersectional perspectives entered an already established institutional framework, often broadening their scope without fully challenging its underlying assumptions or redistributive priorities.

Crucially, this misalignment becomes most visible at the strategic planning level, where the distribution of PGBS is still largely treated as a socially and spatially universal challenge. While design-oriented approaches address how green spaces are used, they

do not account for where they are located in relation to gendered intersectional inequalities, as our analysis of strategic planning documents has shown. There is currently no systematic prioritisation of these areas in Vienna's greening strategies. This resonates with approaches in other cities in the Global North, where Calderón-Argelich et al. (2023) found that most cities aim to ensure the availability and accessibility of green areas to all residents. Only in Barcelona's feminist planning manuals was gender equity mentioned as an objective (Ajuntament de Barcelona 2022). As such, in Vienna, a gender-sensitive approach to PGBS tends to focus more on the design of green spaces than on their distribution, with limited attention to the gendered inequalities in intersectional vulnerabilities (Calderón-Argelich et al. 2023; Huning 2020).

Overall, our contribution resonates with findings from earlier work on mainstreaming climate policy, where "one-size-fits-all" approaches often fail to address intersectional vulnerabilities (Calderón-Argelich et al. 2023; Tschakert and Machado 2012). This gap also mirrors broader challenges identified in integrating spatial equity into climate adaptation planning (Chu and Cannon 2021; Friesenecker et al. 2025). Our findings extend this debate by showing that advancing climate adaptation planning requires a multi-level approach. It requires equity-driven quality measures that ensure accessibility for women and girls of PGBS at the design level, while simultaneously integrating spatial targeting of intersectional vulnerability, particularly in the prioritisation of PGBS provision. A central component of this strategy is the equitable distribution of PGBS throughout the city, beginning with prioritising neighbourhoods where gendered inequalities in intersectional vulnerabilities are most pronounced. Beyond planning, addressing underlying social inequalities, such as the persistent gender pay gap and the unequal distribution of care work across different groups of women along lines of income, age, and migration background, remains essential.

While our study demonstrated that intersectional vulnerabilities of women, heat, and PGBS are strongly interrelated and must be considered together, integrating them remains an ongoing challenge, even in a pioneering city like Vienna. This challenge seems to lie in the still dominant division of power and jurisdiction, both across policy levels and within the administration at the local level. Our strategic documents have at least highlighted this gap: some documents focus explicitly on gender or gender equality, while others address green infrastructure or climate adaptation, but these topics are rarely contextualised together. Their interrelationship remains largely underexplored. Furthermore, gender itself is a complex and multifaceted concept that resists easy categorisation. Likewise, combining heat and PGBS presents its own set of implementation challenges. Addressing the intersection of all three requires interdisciplinary knowledge, networked thinking, and collaborative approaches.

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Ethics approval

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Appendices

Appendix A. Document Analysis

Level/ Region	Year	Title	Author/ Link (last access August 26, 2024)
Europe	2020	New Leipzig Charta – The transformative power of cities for the common good	European Commission
Europe	2021	Forging a climate-resilient Europe – the new EU Strategy on Adaptation to Climate	European Commission
Europe	2021	Horizon Europe – The strategic plan 2021–2024 – An ambitious plan for an ambitious programme (Strategieplan für "Horizont Europa" (2021-2024))	European Commission und Directorate-General for Research and Innovation
Europe	2023	Horizon Europe – Strategic Plan 2025–2027 Analysis	European Commission
Europe	2021	European Green Deal – Delivering on our targets	European Commission
Europe	2013	An EU Strategy on adaptation to climate change	European Commission
Europe	2020	The European Green Deal	European Commission
Europe	2020	EU Biodiversity Strategy for 2030	European Commission
Europe	2021	European Climate Law	European Parliament and the Council
Europe	2017	Report on women, gender equality and climate justice	European Parliament – Committee on Women's Rights and Gender Equality

(*Continued*)

Continued.

Level/ Region	Year	Title	Author/ Link (last access August 26, 2024)
Europe	2013	Green Infrastructure (GI) – Enhancing Europe's Natural Capital	European Commission
Europe	2017	New urban agenda	United Nations
Europe	2015	Sendai Framework for Disaster Risk Reduction 2015–2030	United Nations
National (Austria)	2018	#mission 2030 – Austrian climate and energy strategy (# mission2030 – Die österreichische Klima – und Energiestrategie)	Bundesministerium Nachhaltigkeit und Tourismus & Bundesministerium Verkehr, Innovation und Technologie
National (Austria)	2021	ÖRK 2030_Austrian Spatial Development Concept – Space for Change – Accompanying document. (ÖRK 2030_Österreichisches Raumentwicklungskonzept – Raum für Wandel – Begleitdokument)	Österreichischen Raumordnungskonferenz (ÖROK)
National (Austria)	2020	Out of responsibility for Austria. Government programme 2020-2024(Aus Verantwortung für Österreich. Regierungsprogramm 2020-2024)	Bundeskanzleramt Österreich
National (Austria)	2017	The Austrian Strategy for Adaptation to Climate Change. Part 1 – context(Die österreichische Strategie zur Anpassung an den Klimawandel. Teil 1 – Kontext)	Kronberger-Kießwetter et al.
National (Austria)	2017	The Austrian Strategy for Adaptation to Climate Change. Part 2 – Action plan(Die österreichische Strategie zur Anpassung an den Klimawandel. Teil 2 – Aktionsplan)	Kronberger-Kießwetter and Balas
National (Austria)	2021	Second progress report on the Austrian strategy for adaptation to climate change(Zweiter Fortschrittsbericht zur österreichischen Strategie zur Anpassung an den Klimawandel)	Balas et al.
Local (Vienna)	2019	Smart Climate City Strategy Vienna. Our way to becoming a model climate city(Smart City Wien Rahmenstrategie 2019-2050. Die Wiener Strategie für eine nachhaltige Entwicklung)	Smart City Wien Rahmenstrategie 2019–2050
Local (Vienna)	2022	Smart Climate City Strategy Vienna – The path to becoming a model climate city(Smart Klima City Strategie Wien – Der Weg zur Klimamusterstadt)	Deistler and Homeier
Local (Vienna)	2022	Vienna Heat Action Plan(Wiener Hitzeaktionsplan-Für ein cooles Wien der Zukunft)	Vienna City Administration
Local (Vienna)	2022	Vienna Climate Guide – Towards a climate-friendly city(Wiener Klimafahrplan – Unser Weg zur klimagerechten Stadt)	Vienna City Administration
Local (Vienna)		Government agreement: The Progressive Coalition for Vienna(Regierungsübereinkommen: Die Fortschrittskoalition für Wien)	City of Vienna
Local (Vienna)	2015	Urban Heat Island Strategy Plan Vienna(Urban Heat Islands Strategieplan Wien)	Municipality of Vienna
Local (Vienna)	2015	Thematic concept – Green and open spaces(Fachkonzept – Grün – und Freiraum)	Wieshofer
Local (Vienna)	2018	Thematic concept – Open space (Fachkonzept – Öffentlicher Raum)	Schlager and Irschik
Local (Vienna)	2013	Gender mainstreaming in urban planning and urban development (Handbuch Gender Mainstreaming in der Stadtplanung und Stadtentwicklung)	Vienna City Administration
Local (Vienna)	2014	STEP 2025 – Urban Development Plan Vienna (STEP 2025 – Stadtentwicklungsplan Wien)	MA 18 – Urban Development and Planning

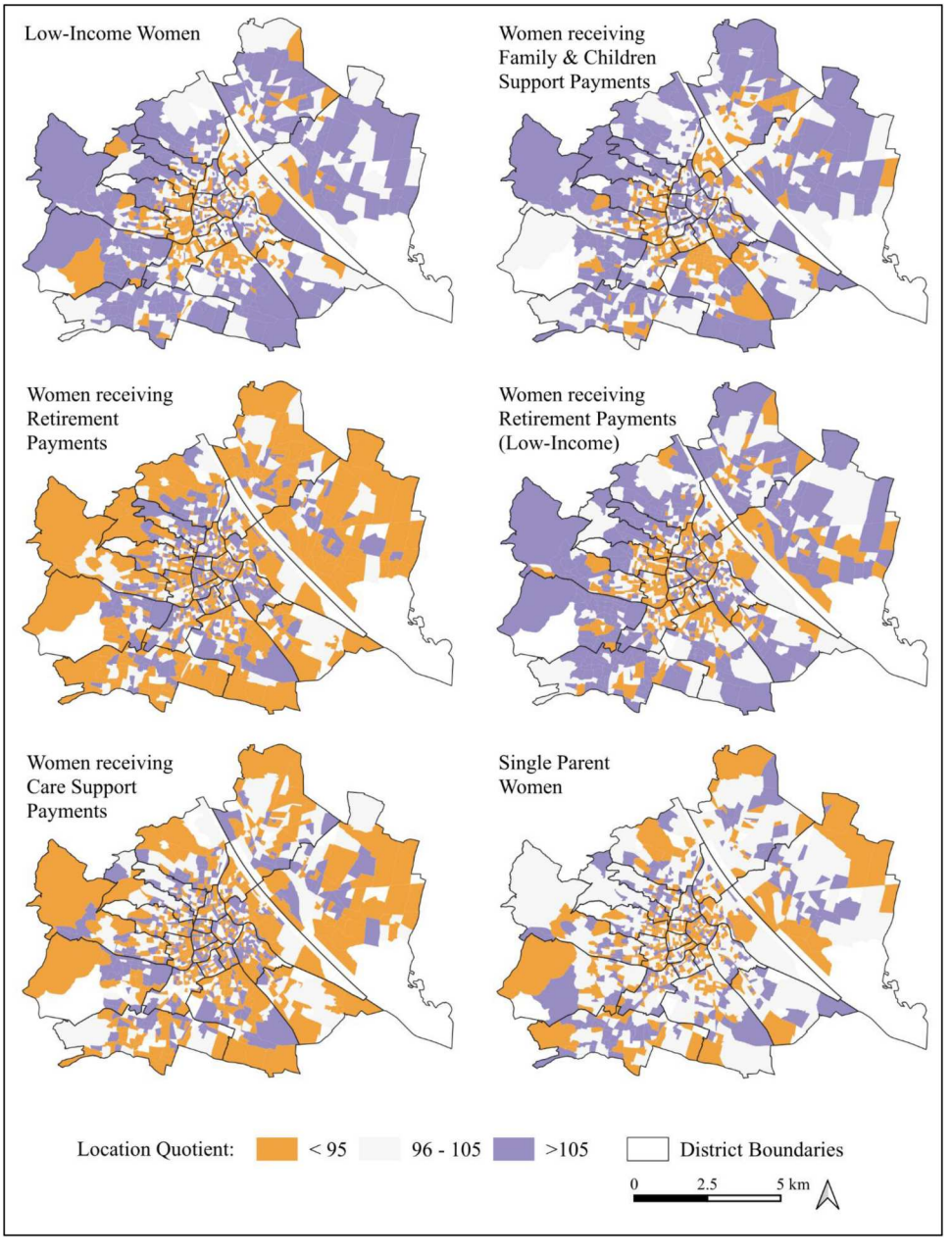
Appendix B. Interviews

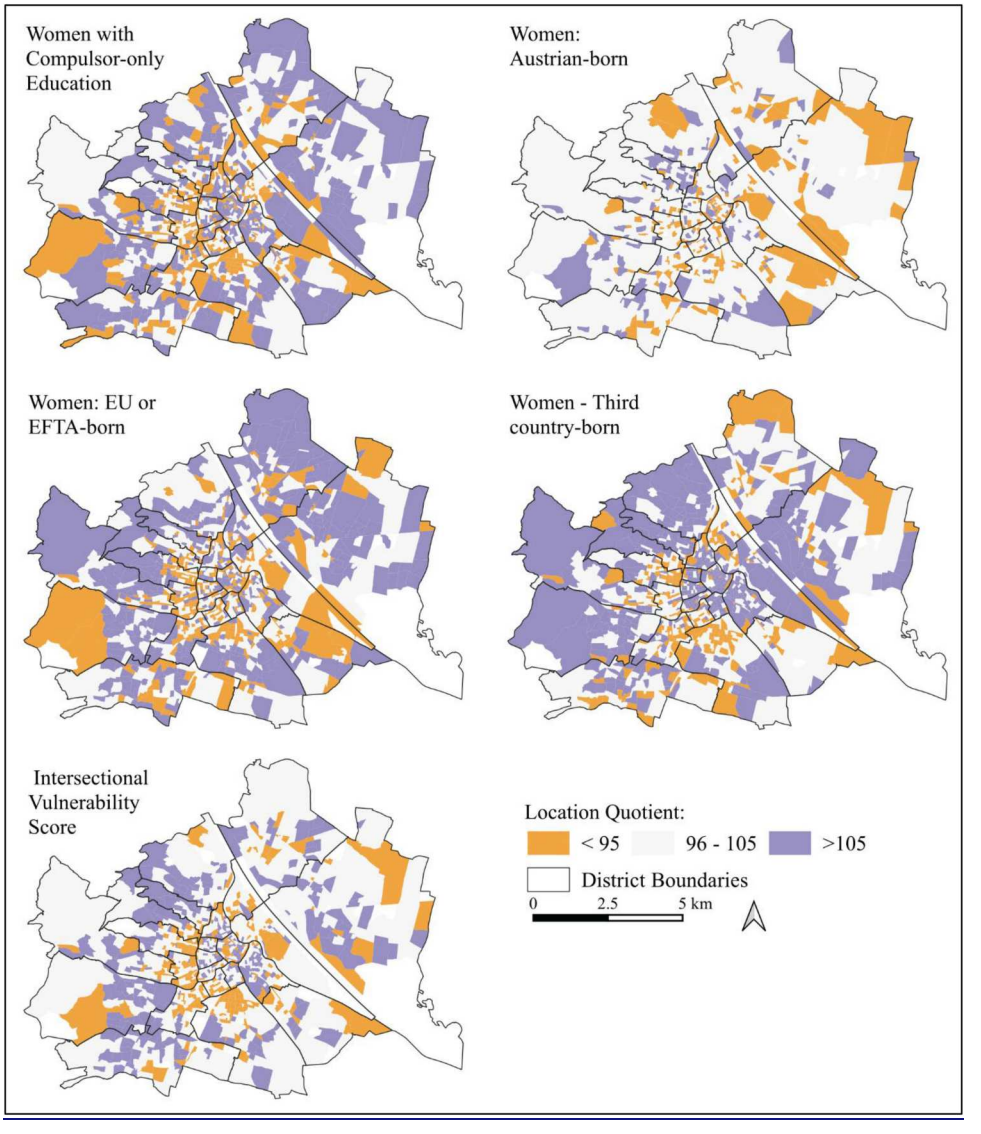
Intervienumber	City Administration	Number of interviewees
I1	MA18 – Urban Development and Planning*	1
I2	MA19 – Architecture and Urban Design	1
I3	MA19 – Architecture and Urban Design	2
I4	MA19 – Architecture and Urban Design	2
I5	MA22 – Environmental Protection	1
I6	MA42 – Parks and Gardens	2
I7	MA42 – Parks and Gardens	2
I8	MA42 – Parks and Gardens	1
I9	Executive Group for Construction and Technology	1

*MA stands for Magistratsabteilung (municipal department).

Appendix C. Location quotients of women in selected vulnerable groups.

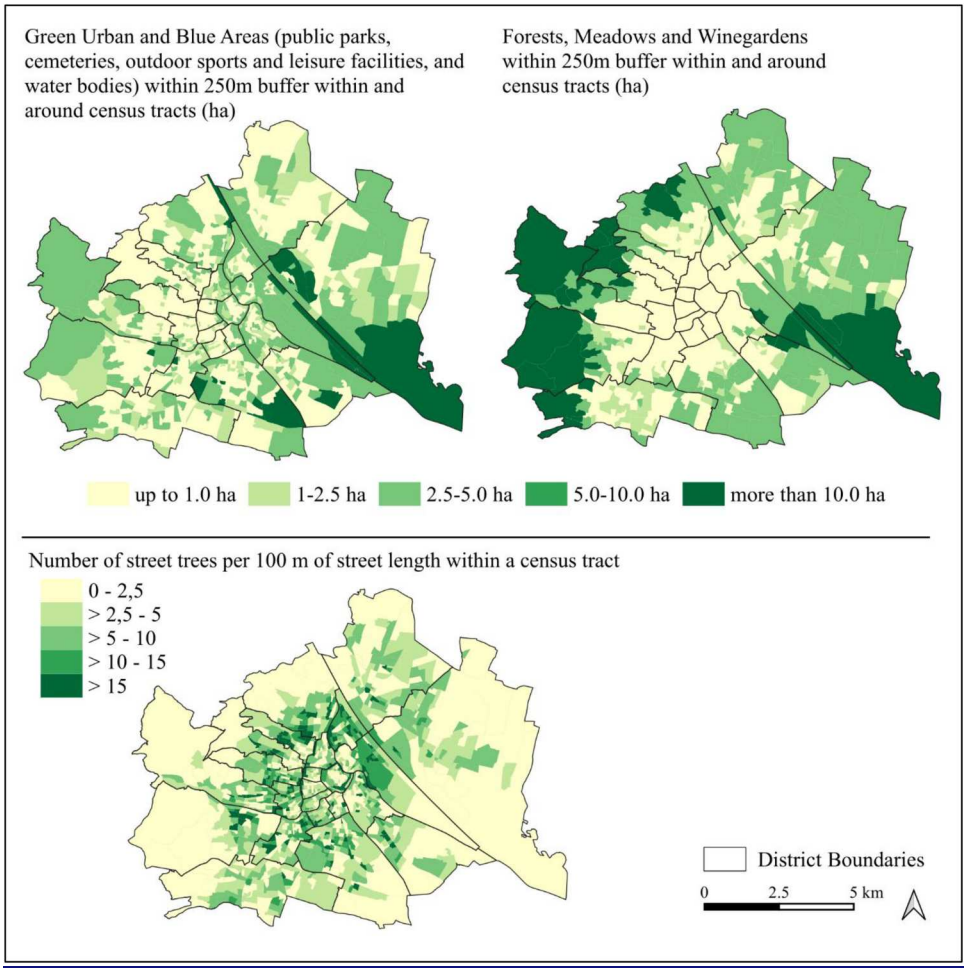
Own calculations and depiction. Sources: statistik Austria.




Women with Compulsor-only Education
Women: Austrian-born
Women: EU or EFTA-born
Women - Third country-born
Intersectional Vulnerability Score
Location Quotient:
< 95
96 - 105
>105
District Boundaries
0
2.5
5 km

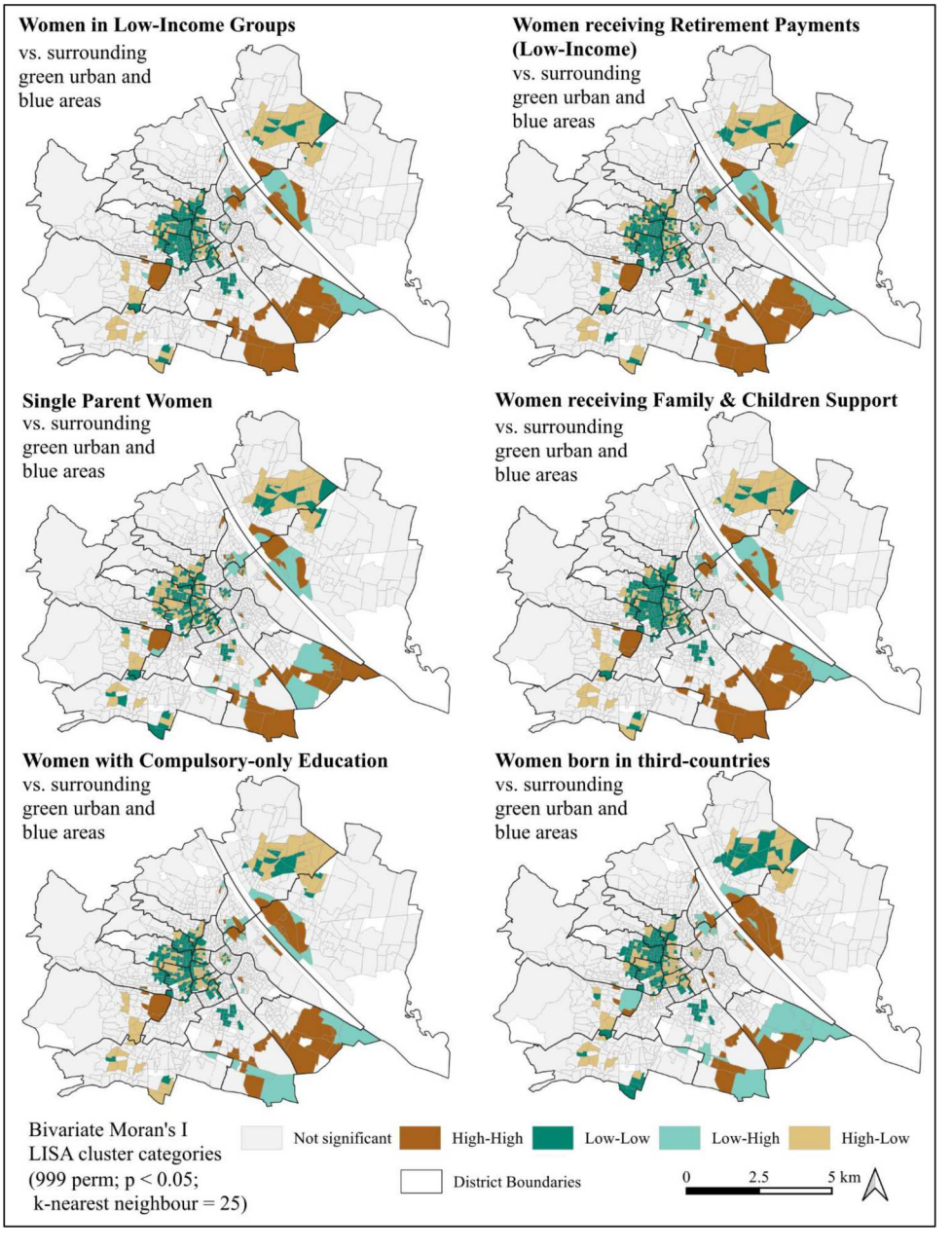
Appendix D: distribution of public urban green and blue space per census tracts

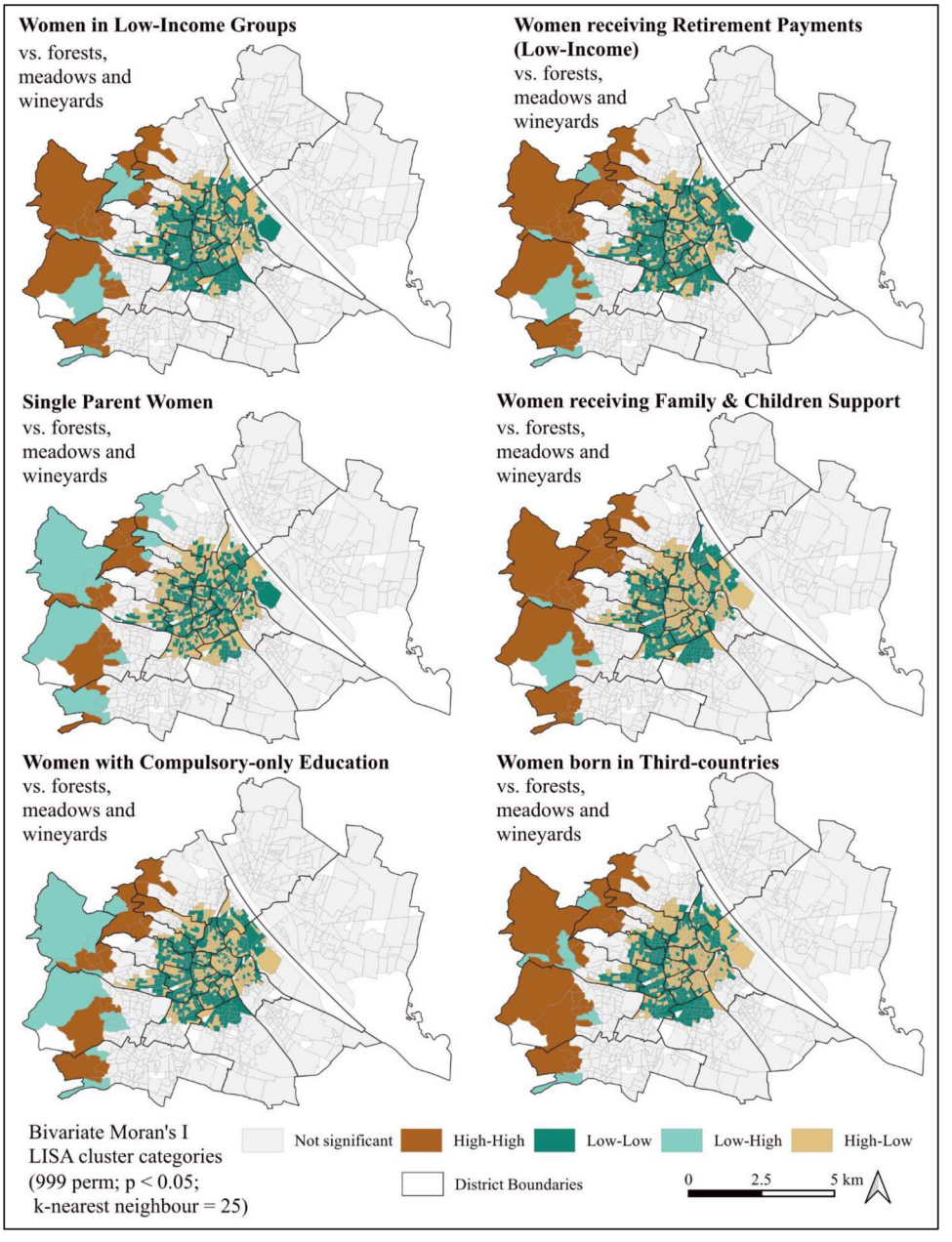
Own depiction of actual land use data and public tree cadaster. Source: data.wien.gv.at.

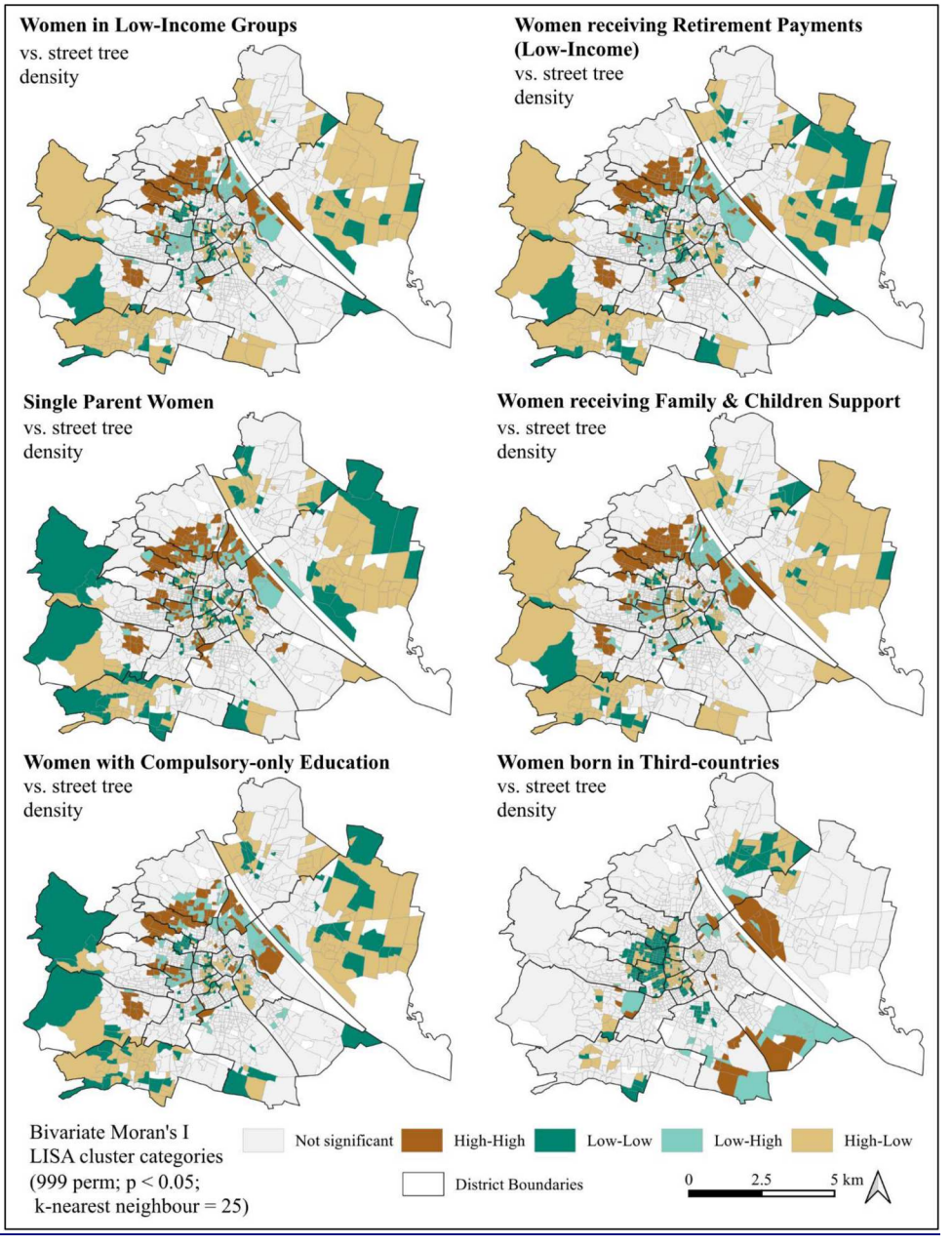


Appendix E: bivariate cluster maps of location quotients (LQs) for selected intersectional vulnerability categories and surrounding public green and blue spaces

Own calculation and depiction. Source: Statistik Austria and data.wien.gv.at




Women in Low-Income Groups
vs. forests, meadows and wineyards
Women receiving Retirement Payments (Low-Income)
vs. forests, meadows and wineyards
Single Parent Women
vs. forests, meadows and wineyards
Women receiving Family & Children Support
vs. forests, meadows and wineyards
Women with Compulsory-only Education
vs. forests, meadows and wineyards
Women born in Third-countries
vs. forests, meadows and wineyards
Bivariate Moran's I LISA cluster categories (999 perm; p < 0.05; k-nearest neighbour = 25)
Not significant
High-High
Low-Low
Low-High
High-Low
District Boundaries
0
2.5
5 km


Women in Low-Income Groups
vs. street tree density
Women receiving Retirement Payments (Low-Income)
vs. street tree density
Single Parent Women
vs. street tree density
Women receiving Family & Children Support
vs. street tree density
Women with Compulsory-only Education
vs. street tree density
Women born in Third-countries
vs. street tree density
Bivariate Moran's I LISA cluster categories (999 perm; p < 0.05; k-nearest neighbour = 25)
Not significant
High-High
Low-Low
Low-High
High-Low
District Boundaries
0
2.5
5 km