Advancing Nature-based Solutions for Urban Resilience

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CLIMATE CHANGE

Exposure	Severe weather	Extreme heat	Air pollution	Water contamination & quantity	Changes in vector ecology	Environmental degradation	Rising sea levels	Food supply and safety
Selected health risks	Injuries, fatalities, drowning	Heat-related mortality and morbidity,	Asthma, allergies, CVD	Dehydration, Infections with: *Campylobacter*, *Cholera*, *Cryptosporidium*, *Vibrio*, etc.	Chikungunya, dengue, Lyme disease, malaria, Rift Valley fever, West Nile fever	Civil conflict, physical and mental health	Displacement, drowning	Malnutrition, diarrheal diseases

Human/ Social/ Financial/ Physical/ Natural Capital

Human/ Social/ Financial/ Physical/ Natural Capital

Semenza JC, Ebi KL. *J Travel Med.* 2019 Jun 11;26(5).

IPCC Risk Framework:
The nexus of hazard, vulnerability, and exposure


Temp

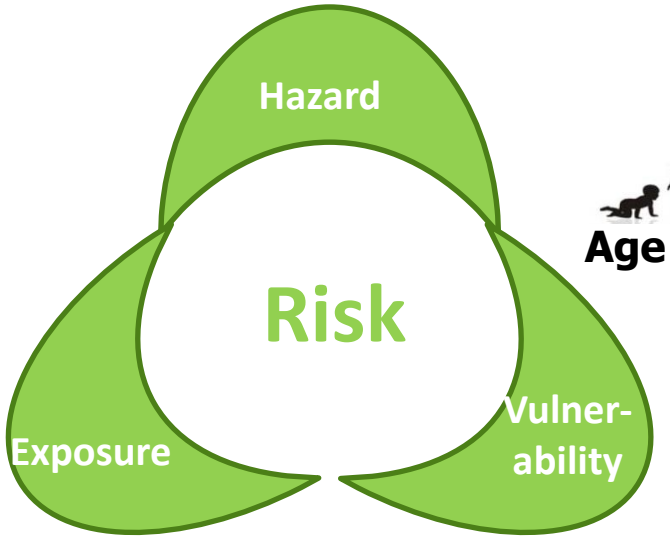

Rain


Heat


Geography


Hygiene


Wild animals



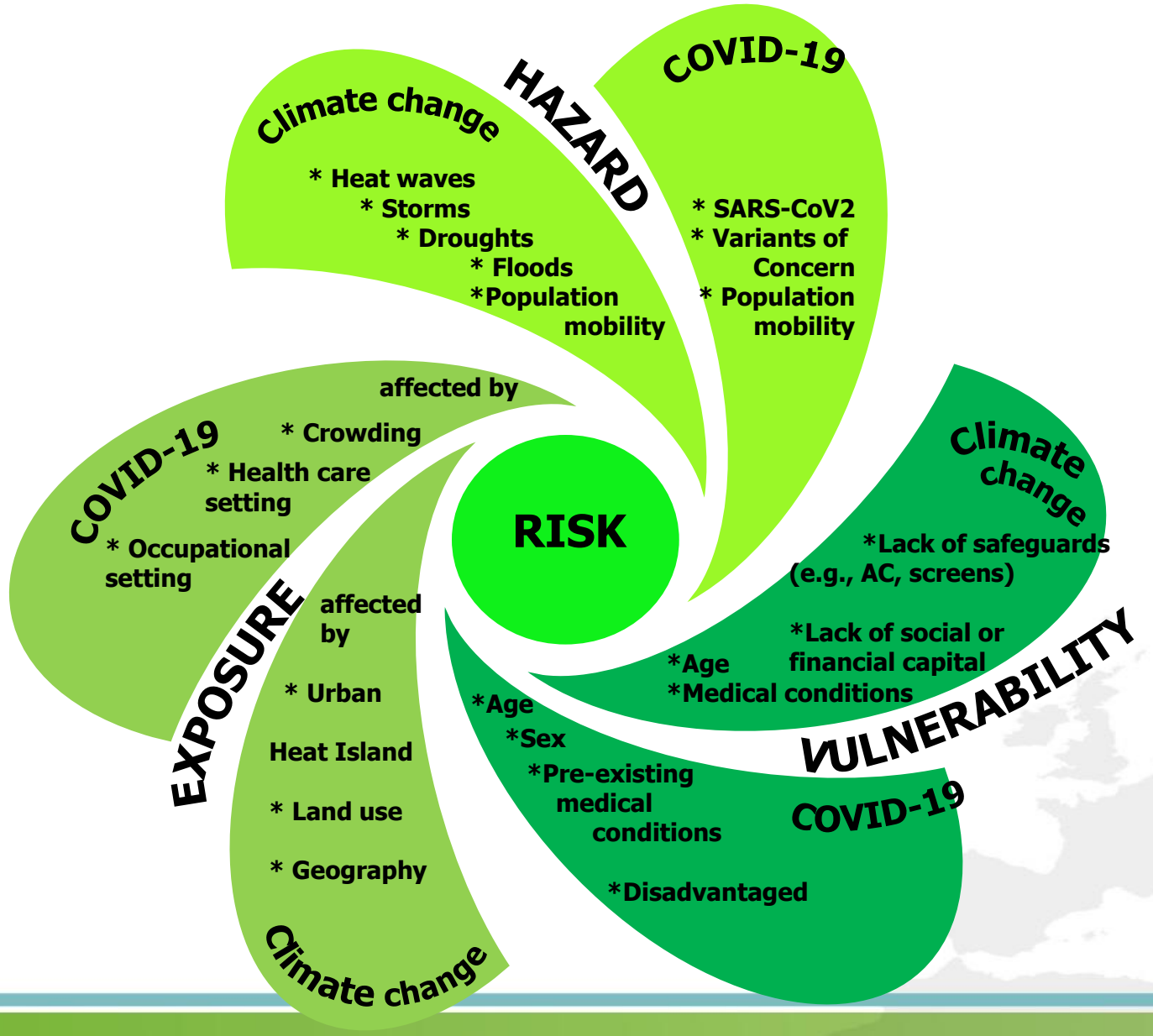

Age Sex


Social inequality


Social capital


Medical cond.

The convergence of two compounding risks



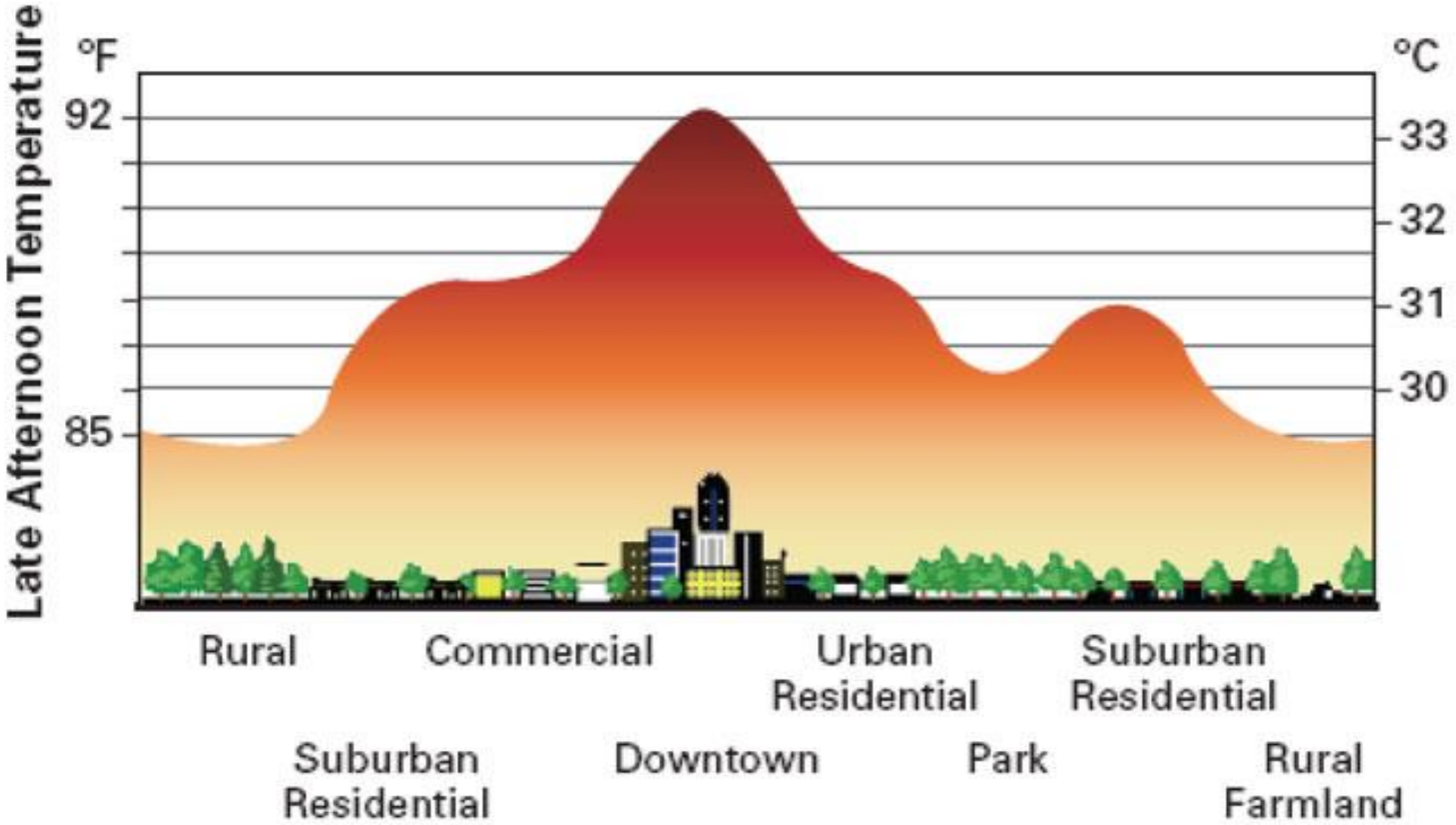
J.C. Semenza, *The Lancet Regional Health -Europe*. 2021:100231.

Outline

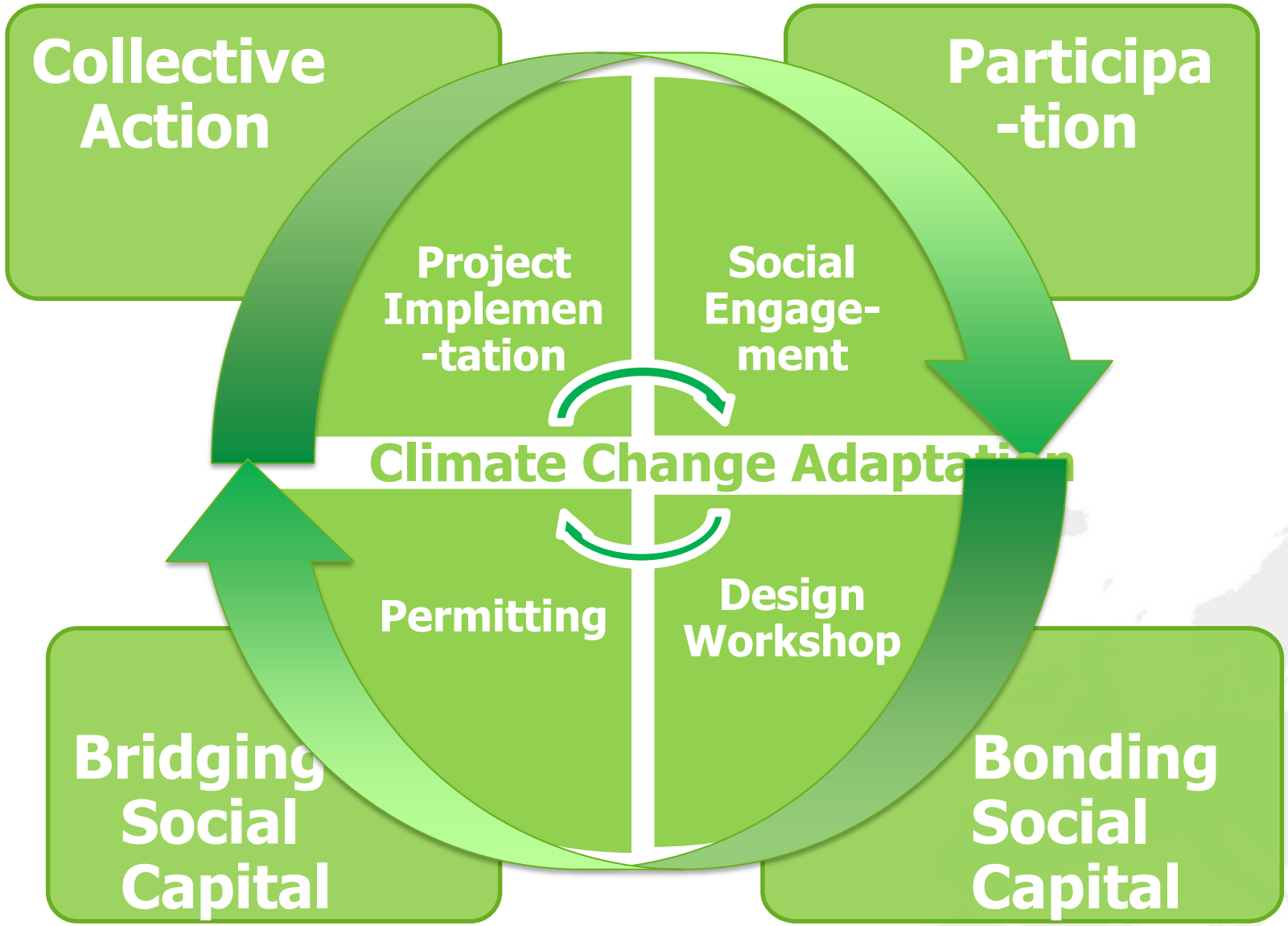
- Urban **interventions** to attenuate the negative consequences of climate change and climate variability

- Social interventions to enhance community capacity and **resilience**

Urban heat island effect



Urban blight in Portland, OR



Semenza JC, March TL. *Environment and Behavior*. (2009); 41(1): 22-42

Urban interventions to advance community resilience

Interventions	Activities	Adaptation benefits
Urban forestry	Planting trees in parking strips or abandoned lots.	Shading Evapotranspiration
Urban vegetation	Build trellises for hanging gardens; planter boxes on street corners; plant in abandoned lots;	Decreasing air conditioning Ambient cooling Increasing property values Enhancing air quality
Urban gardens	Create community gardens in urban neighborhoods with elevated planter boxes if no soil available	Shading Evapotranspiration Local food production
Green roofs	Installing green roofs on small structures	Reducing rooftop temperatures Lessening pressure on sewer
Cool roofs	Install roofs with high solar reflectance	Energy bills Increase indoor occupant comfort

Semenza, J.C. Lateral Public Health: *Springer Media Publishing* New York, NY. 2011.

Urban interventions to advance community resilience

Interventions	Activities	Adaptation benefits
Cool pavement	Install light-colored or permeable pavements in parking lots or school yards	Porous, pavements allow water to percolate and evaporate. Cooling the pavement surface and surrounding air.
Window screens	Repair and install insect screens on houses	Protect against emerging vector-borne diseases
Vector abatement	Eliminate standing water in depressions or objects	Prevent propagation of vector-borne diseases
Habitat restoration	Plant native species and eliminate invasive plants	Increased biodiversity decreases dispersion of zoonoses.
Rainwater storage	Increasing rainwater storage (domestic water butts, unpaved gardens etc)	Overflows in peak periods do not contaminate rivers

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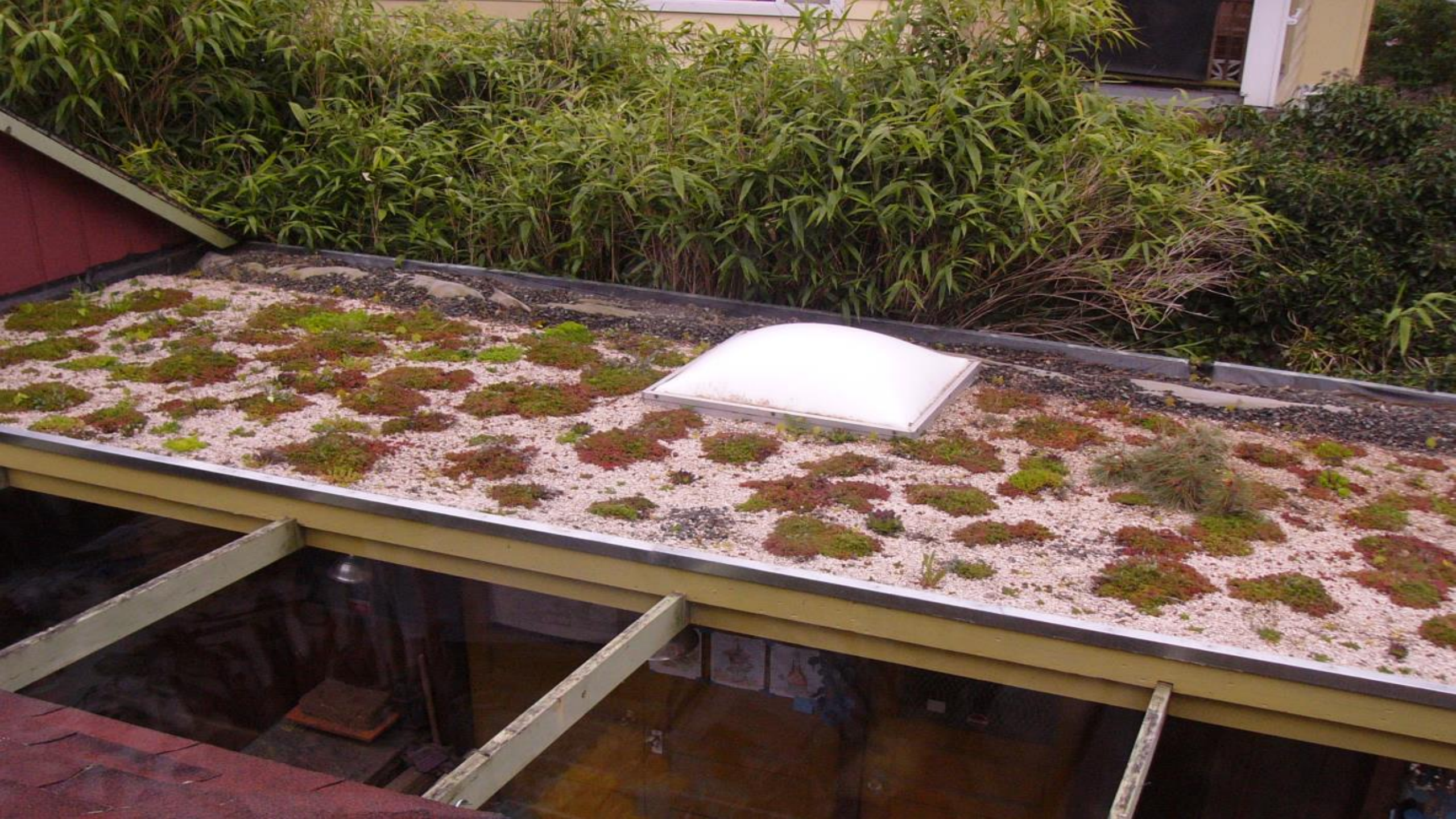


Study population

674 completed surveys total:

- 325 pre-intervention surveys
- 349 post-intervention surveys

Of the 409 subjects interviewed:

- 265 (65%) subjects completed both surveys

55% women

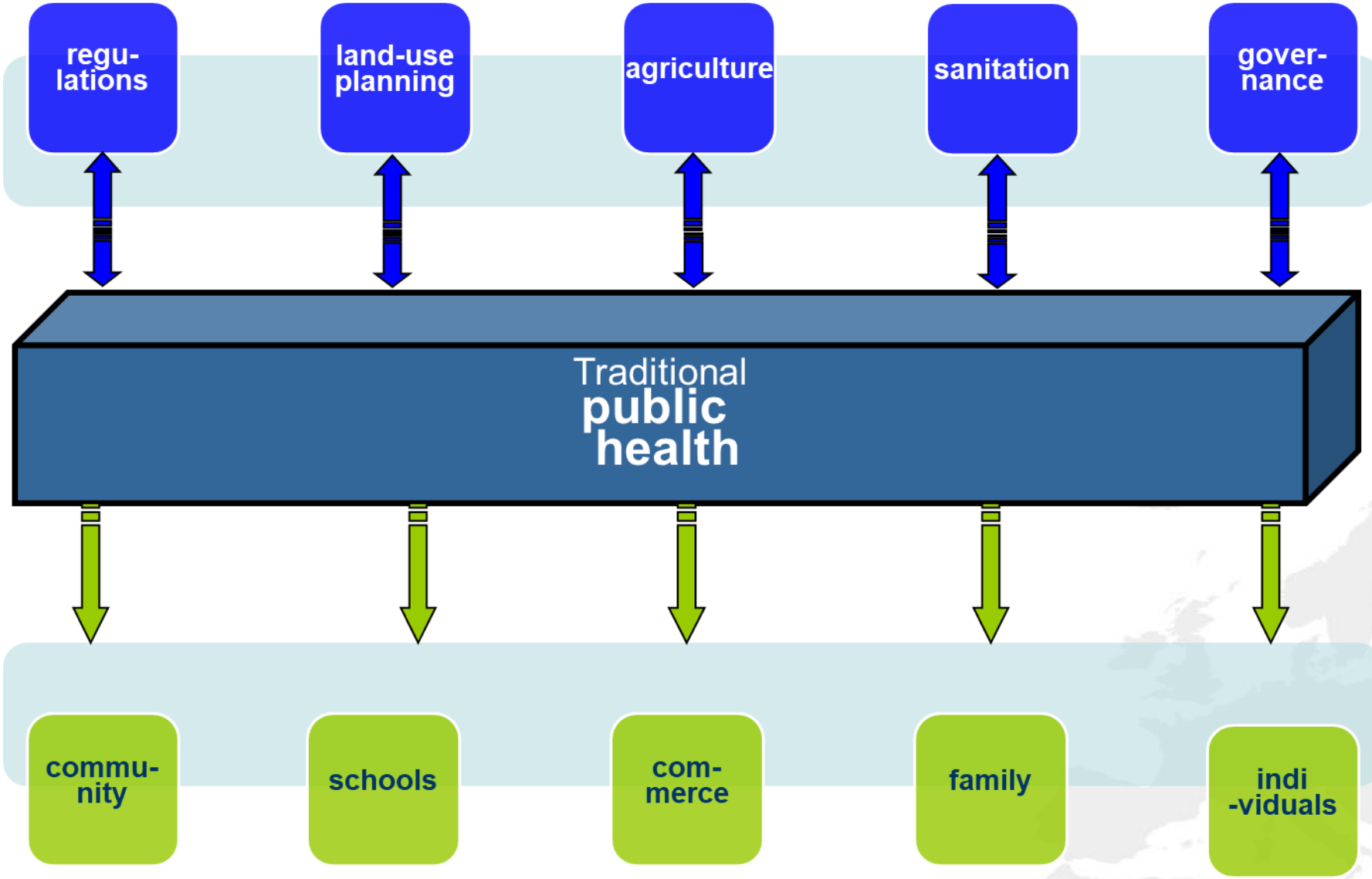
83% older than 50 years

58% renters

Multivariate Results

	Hoetelling's Trace	F	P	N
Sense of community	0.09	3.97	<0.001	260
Social interaction	0.04	2.29	0.06	261
Perceived NH control	0.02	0.84	0.52	262
NH participation	0.01	0.34	0.85	241
Social capital	0.15	1.71	0.04	229
Mental health	0.09	1.95	0.03	250

Traditional Public Health



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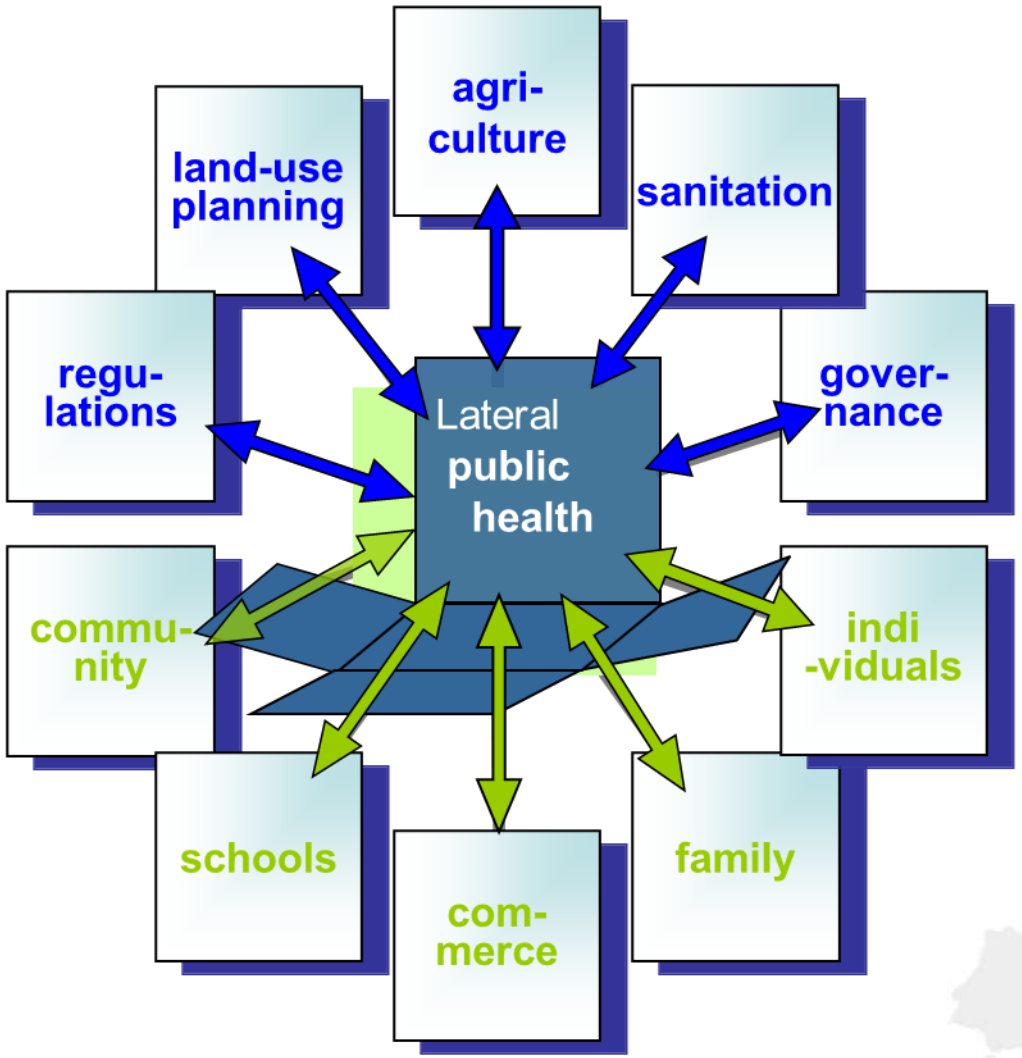
Lateral Public Health



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Lateral public health strives to:

- advance **social networks** within communities to build **bonding social capital**
- enhance **bridging social capital** by linking communities with parties unequal in power and access
- increase community-based participation in **decision-making**, preparedness and response
- intervene on all aspects of risk: **hazard, exposure and vulnerability**
- build inter-agency **connections** to overcome predefined jurisdictions
- transcend the **siloed confines** of traditional public health

Conclusions

- These data vindicate the merits of **public participation in urban design** with direct benefits to public health.

- Social intervention can create human-scale urban landscapes that are beneficial to **social capital** and well being.
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- Urban interventions can increase **community resilience** to environmental stressors.

- Integrating **public and ecosystem health** systems can foster urban resilience

http://cityrepair.org/

http://communitecture.net

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