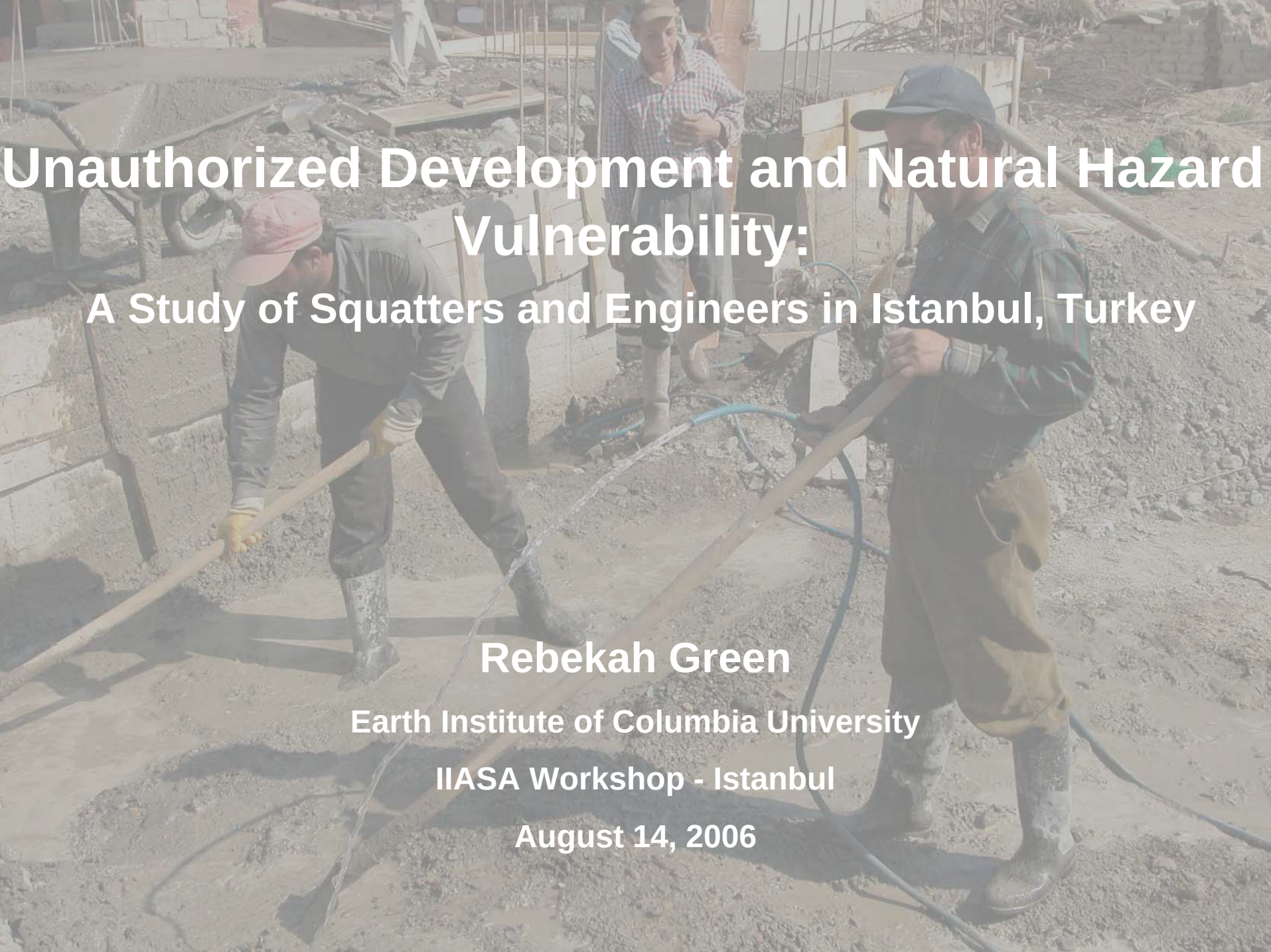


Unauthorized Development and Natural Hazard Vulnerability:

A Study of Squatters and Engineers in Istanbul, Turkey

Rebekah Green

Earth Institute of Columbia University

IIASA Workshop - Istanbul

August 14, 2006

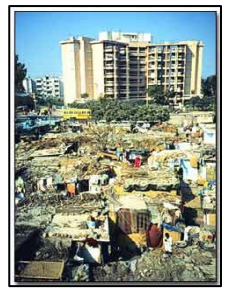
Introduction

Urban Growth in Rapidly Industrializing Regions

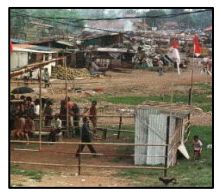
	Seismic Hazard	Annual Growth Rate (%)	Unauth-orized Housing (%)	Squatter Housing/ Non-Permanent Structures (%)
Nairobi, Kenya	Low	5	75	33
New Delhi, India	Moderate	0.5	48	17
Cairo, Egypt	Moderate	2.1	65	6
Jakarta, Indonesia	High	4.1	70	33
Bogotá, Columbia	High	3.5	8	3
Istanbul, Turkey	High	5	51-70[1]	5

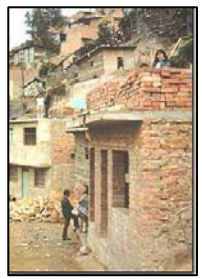
1 Internal estimates place illegal/unauthorized housing at 70 percent in 2000.
Source: Angel, S. (2000). *Housing Policy Matters: A Global Analysis*, Oxford University Press, Oxford.


Nairobi, Kenya


New Delhi, India


Cairo, Egypt

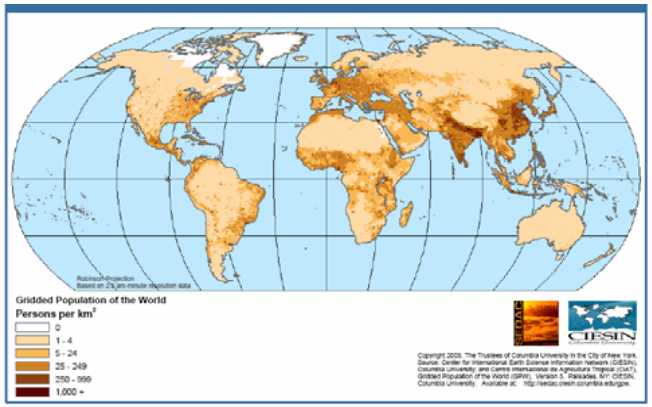

Jakarta, Indonesia


Bogotá, Columbia

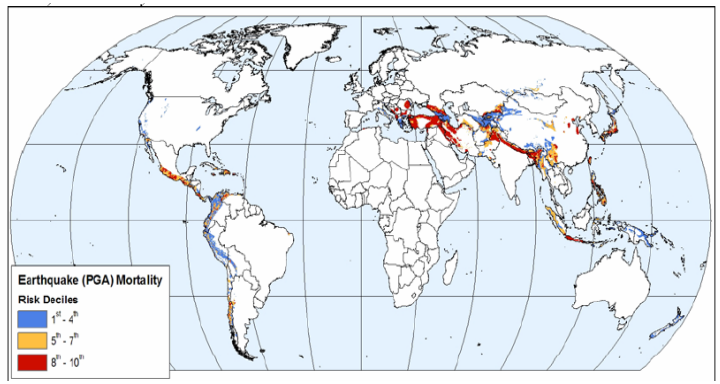

Istanbul, Turkey

Urban Growth and Seismicity in Rapidly Industrializing Regions

Global distribution of world population, 2004



Global distribution of earthquake risk, mortality



Loss of Life from Geophysical Hazards by Quintile of GDP (PPP) per capita, 1980-2005

GDP (PPP) per capita, 2004	No. Countries	Loss of Life	Countries with Highest Loss of Life per Quintile
1st quintile	15	14,193	Japan, Italy, Taiwan, U.S., Greece
2nd quintile	23	27,806	Mexico, Russia, Chile, Malaysia, Puerto Rico
3rd quintile	20	145,471	**Iran, Columbia, Turkey**, Philippines, Algeria
4th quintile	27	153,960	**Pakistán, India**, **Armenia,** Indonesia, Ecuador
5th quintile	21	14,625	Afganistan, Nepal, Yemen, Tajikistan, Kyrgzstan
Total	**106**	**356,055**	**Bold** countries indicate top five countries globally

**If 2004 Tsunami included, figure rises to by 220,092; Indonesia and Sri Lanka added to 4th quintile.

Table: based upon EM-DATA country mortality statistics and 2004 UNDP development statistics. Earthquake Risk: [1] Maxx Dilley, et al., *Natural disaster hotspots: A global risk analysis*, 2005. Population Projections: http://sedac.ciesin.columbia.edu/gpw/

Urban Growth in Istanbul

	Annual Growth Rate (%)	Unauth-orized Housing (%)	Squatter Housing/ Non-Permanent Structures (%)
Istanbul, Turkey	**5**	**51-70[1]**	**5**

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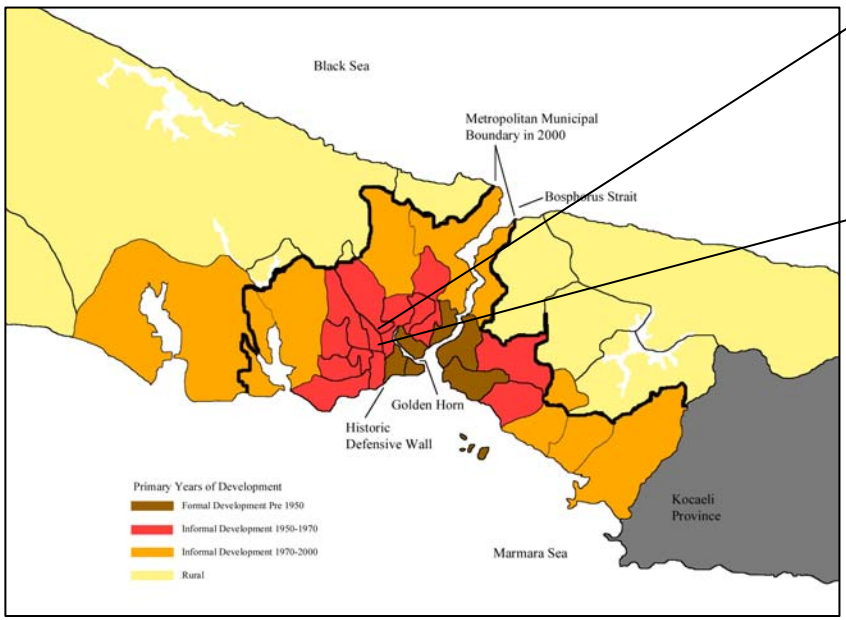

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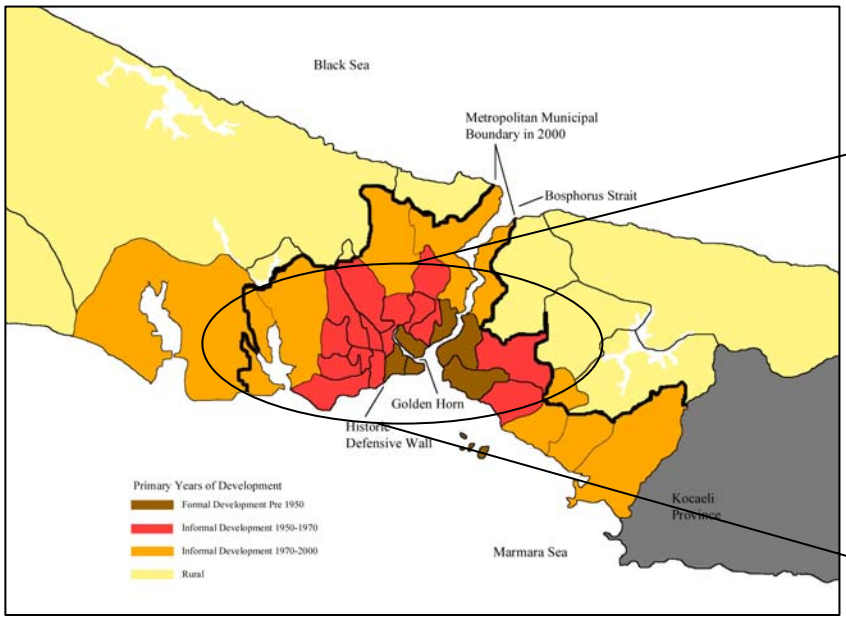

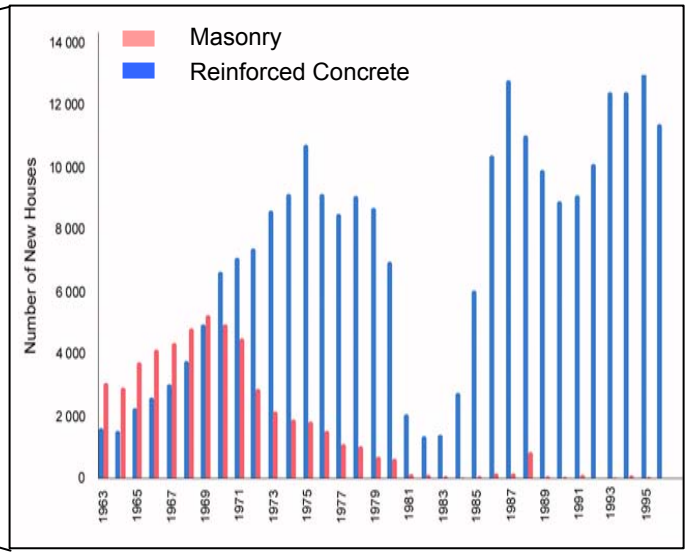

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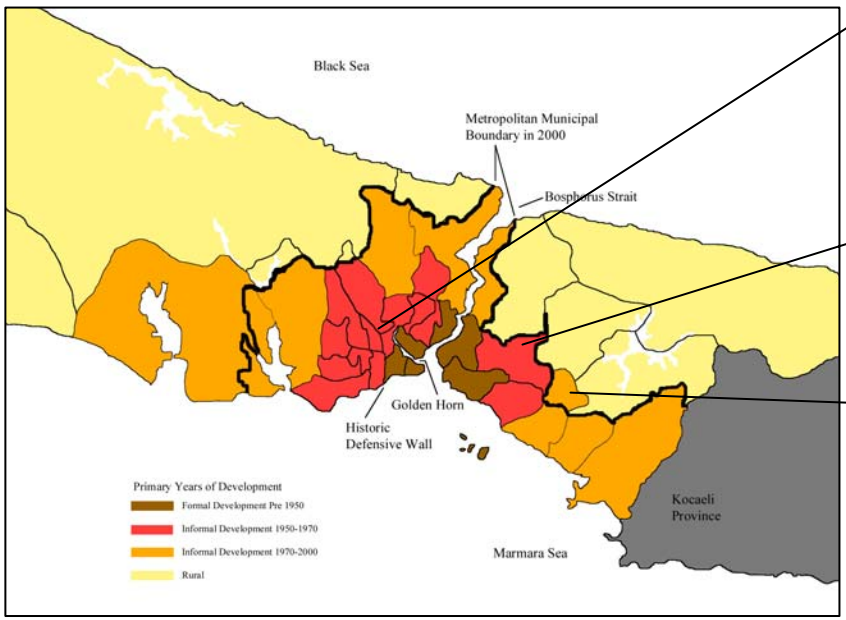


Methodology
Site Selection

•First Order Assessment of Housing and Risk Perception in Four Municipalities

-Risk perception of homes

↓

-Strategies used to reduce vulnerability to seismic hazard

↓

-Effects on physical vulnerability of housing

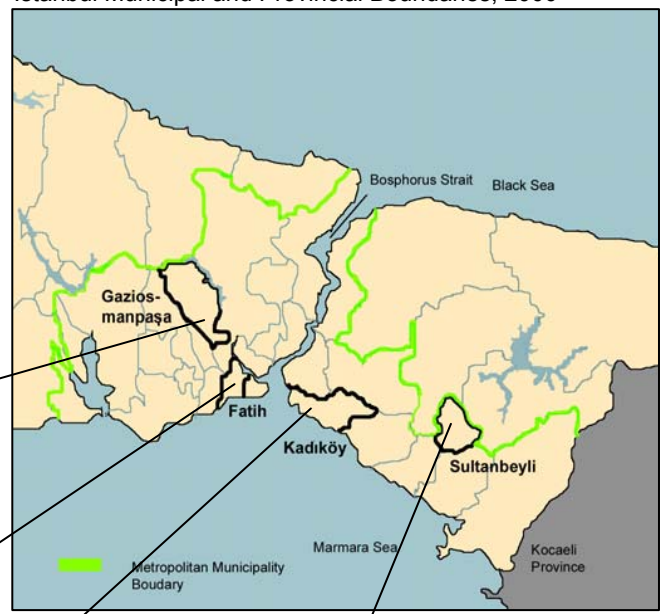
• Four municipalities

-Resident interviews (48)

-Engineer interviews (10)

-Structural Assessments (~35)

Istanbul Municipal and Provincial Boundaries, 2000




Gaziosmanpaşa


Fatih


Kadıköy


Sultanbeyli

Decreasing Cost through Self Building

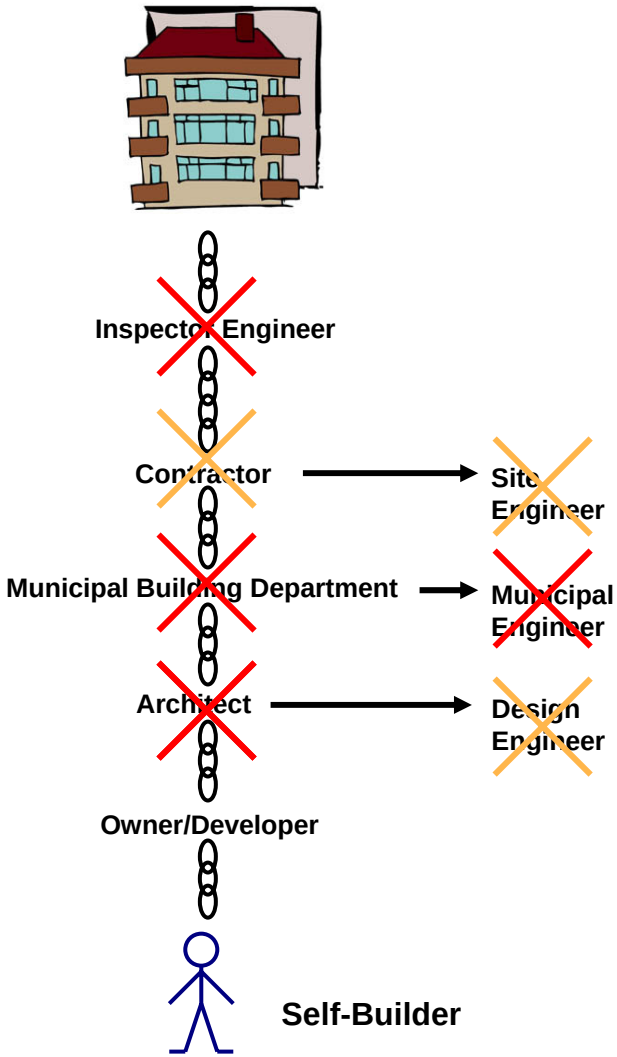
• Unauthorized Self-Building Considered a Means of Reducing Construction Costs

- Reduced professional contractor profit

-Reduce costs associated with building code compliance

-Reduce or eliminate design fees

-Eliminate permitting fees and requirements



Risk Perception

Trust in Own Housing

- Residents in unauthorized housing districts most trustful in areas of higher expected seismic hazard
- Risk perception linked to degree of self-building

		Owner-Occupied, Self Built	*Expected Seismic Intensity*	*Average Estimated Structural Damage*[1]	***Trust in Own Structures (Likart Scale, Averaged)***
Predominantly Unauthorized Housing	**Gaziosmanpaşa**	55%	VII-VIII	Slight	Ambivalent
	Sultanbeyli	80%	VIII-IX	Moderate	Trustful

1. Erdik, M., Aydınoğlu, N., Barka, A., Yüzügüllü, Ö., Siyahi, B., Durukal, E., Fahjan, Y., Akman, H., Birgören, G., Alpay-Biro, Y., Demircioğlu, M., Özbey, C., Şeşetyan, K., and Ansal, A. (2003). "Earthquake Risk Assessment for the Istanbul Metropolitan Area - Final Report." Boğaziçi University Press, Istanbul.

"An illegal building is better."
-Gaziosmanpaşa resident

"What [my family] did is really strong, because we were going to live here ourselves."
-Sultanbeyli resident

Risk Perceptions
Distrust in the Building Process

- Widespread distrust of individuals responsible for ensuring seismic resistant construction in authorized housing system

  - The knowledge of those involved

  - The intent of those involved

Istanbul Residents' Statements Regarding Contractors and Engineers

	Statements		Residents Interviewed		
	Total	**Percent Negative**	**Total**	**No. Negative View**	**Primary Concerns**
Regarding Contractors	58	66	26	23	thievery, ignorance
Regarding Engineers	53	40	20	4	profiteering, professionalism, competence

"If I had been a contractor, I too would have stole a bit from the cement, from the sand, from the steel. [Their work is] a bunch of thievery.
-Fatih resident

Vulnerability Reduction Strategies
Self Building as Means of Increasing Seismic Resistance

- Unauthorized Construction Decreased Residents' Perception of Vulnerability

"When engineers are no longer part of the process, the building becomes a bit stronger."
-Sultanbeyli resident

Affects of Self Building on Housing Quality

- Unauthorized Construction Increased Physical Vulnerability of Structures
  - -Structural specifications inadequate
  - -Poor detailing, insufficient steel ratios
  - -Watering down concrete
  - -Improper curing
  - -Incremental construction

Conclusions
Reducing Vulnerability in Unauthorized Housing Districts

- Vulnerability Reduction must be Culturally and Contextually Specific
  - Addressing Distrust
    - -Professionalization
    - -Promoting non-antagonistic interactions
      - -Ombudsman offices
      - -Partnership between Professionals and Locals in Community Vulnerability Assessment
  - Strengthening Knowledge with Social Networks in Unauthorized Districts
    - -Demonstration Projects Showing Low-cost Construction Techniques
    - -Training in Developing Unauthorized Districts

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