

The concentration of economic resources and inequality

Distinction between income/wealth level and wealth distribution

According to the common definition, **income** denotes the flow of economic resources including wages and investment returns, while **wealth** refers to the value of assets minus liabilities. Wealth is primarily accumulated through three means (Howell & Elliott, 2019): wages and other forms of income that accrue over the short term; returns on investments that accrue over the longer term; and intergenerational transfers that accrue across life times (Alvaredo et al., 2013; Charles & Hurst, 2002; Fox, 2016; Keister, 2014; Oliver & Shapiro, 2006; Volscho & Kelly, 2012).

High **income level** does not necessarily imply a high **wealth level**. For example, some young professionals in high tech regions (like San Jose) could earn the above average income but have limited net wealth due to the considerable student debt or high interest mortgages. Some retired senior people might have significant savings and living in high value properties but only have modest annual incomes. These examples show that considering both income and wealth is essential for identifying the vulnerabilities and resilience in socio-economic hazard analysis (Oliver & Shapiro, 2006).

Wealth distribution represents the concentration of economic resources across a certain amount of the population. Two communities with similar overall wealth levels can exhibit drastically different distributions. For instance, one could be characterized by a small elite holding most local real estate, while the other might have broader middle class homeownership with smaller wealth gaps among households. This variation in distributions **between** and **within** different regions (Suss et al., 2024) can shape different preparedness, experiences, and recovery patterns from hazards.

Wealth concentration and racial inequality

In the U.S., **wealth inequality** has been growing over recent decades and has detrimental effects on social outcomes, regarding educational attainment, physical health, and emotional well-being (Hansen, 2014; Keister, 2014; Shapiro, 2017). Wealth inequality has been historically associated with **racial inequality**, as the inequalities of the past not only play forward to influence those of the present and future, they also link with historical inequalities of race that concentrate in space as well as time (Fox, 2016; Gotham, 2014; Shapiro, 2017). The inequality returns on housing investments and disparate intergenerational transfers of assets (Alvaredo et al, 2013; Charles & Hurst, 2002; Fox, 2016; Hansen, 2014).

Flippen (2004) demonstrates how racially segregated residential patterns exacerbate the disparities in home appreciation rates, even when controlling for neighborhood socio-economic status. The finding (Flippen, 2004) indicates that “both high minority concentrations and concentrated neighborhood poverty exert a powerful negative impact on housing wealth”, reinforcing the broader wealth gap between majority-White and minority communities. In addition, Oliver & Shapiro (2006) analyzes the racial gap by examining total assets and debts rather than income alone, illustrating the racial inequality gap between blacks and whites. This dynamic underscores the spatially and racially concentration of wealth over the past.

How has the concentration of economic resources influenced planning for Hazard?

Unequal infrastructure investment and development

Existing studies indicate that the development in coastal and floodplain regions has often been driven by planning decisions that prioritize short-term economic gains over long-term resilience (Berke, 1982; Holway & Burby, 1993; Campbell, 1996; Mileti, 1999; Vale, 2017). Iglesias et al. (2021) report that 57% of structures, including homes,

schools, hospitals, office buildings, etc., are located in hazard hotspots, with development in these hazardous zones continuing to grow more rapidly than the national average. The unrestricted construction development caused rapid deterioration of many coastal environments and depletion of natural resources (Berke, 1982). These trends suggest the increasing risk of economic losses due to costs of hazard preparedness and damage from hazard.

Economic disparities can significantly influence hazard planning and infrastructure investment. Wealthier communities have larger financial resources to invest in resilient infrastructure, benefiting from higher economic returns. Compared to financially disadvantaged groups, these wealthier communities have greater capacity to cover repair and maintenance costs in hazard-prone areas. Also, these communities can afford more advanced hazard mitigation measures, such as flood barriers and other proactive infrastructure, to enhance their preparedness. In contrast, less wealthier groups often lack the financial capacity to implement similar protective measures, leaving them more vulnerable to hazard.

Hazard insurance and financial burden

Insurance is an important tool in planning for hazards. The concentration of economic resources can shape the unequal pattern for hazard planning as properties with higher values often require more expensive insurance coverage. Recovery costs can impose greater financial strain on households with costly properties. Kousky et al. (2020) highlight how insufficient insurance coverage in floodplains increase mortgage credit risk, making it difficult for homeowners without substantial savings to recover from major property losses. Wealthier communities have greater financial capacity for better insurance coverage, while the high costs of insurance could become a big financial burden to low-income households, thereby limiting their ability to adequately prepare for hazards.

Mitigation priorities and political influence

The concentration of wealth is closely linked to political influence shaping the unequal distribution of mitigation efforts. Wealthier communities or neighborhoods tend to have stronger community organization and more established networks, enabling them to effectively advocate for mitigation projects and prioritized protection. According to Michael et al. (2023), disaster preparedness and resilience planning efforts should include multiple networks, including informal connections such as community groups, religious organizations, and nonprofits. These diverse networks facilitate resource mobilization and dissemination of knowledge and information about hazards (Michael et al., 2023). Also, the disparity in political representation can result in uneven distribution of government funding for mitigation efforts. Wealthier communities could receive disproportionate protection, while financially-disadvantaged groups may have limited access to planning resources. These mitigation priorities can cause unequal protection, making wealth-disadvantaged groups more vulnerable in the hazard planning.

How has the concentration of economic resources influenced experiences of Hazard?

Unemployment and displacement

Studies (Kirby 1976; Handy & Niemeier 1997; Kwan 1998; Caschili et al. 2015; Shi et al. 2020; Papilloud & Keiler 2021) have demonstrated the impact from natural hazard on **local mobility**, which is associated with **unemployment** shaping different experiences to hazards. For less privileged residents and non-property owners, local damages are more likely to trigger financial liabilities as a result of experiencing an increased likelihood of losing one's job (Elliott & Pais, 2006); having to move (Elliott & Howell, 2017); paying higher rents due to reduced housing stock (Vigdor, 2008). Natural hazards, such as flooding, can disproportionately impact economically vulnerable populations, particularly those who are unable to work remotely or who work on an hourly basis and must commute even during flood events. For individuals dependent on daily travel, especially in regions with poorly connected road networks, the lack of alternative routes exacerbates their vulnerability by limiting access to unflooded roads and increasing exposure to hazardous conditions. In contrast, wealthier individuals who are less reliant on high mobility jobs may experience less impact.

Housing displacement is another key consequence of economic inequality in natural hazards (Paul et al., 2024). Elliott & Howell (2016) indicates that marginalized groups, particularly Black and Latina women, experience greater long-term residential instability due to economic and social disparities. Homeownership, as a primary means of wealth accumulation (Fussell & Harris, 2014), is less accessible to lower-income individuals, making them more vulnerable to post-disaster displacement (Aaronson, 1999; Dietz & Haurin, 2003; Rossi, 1996). Homeowners normally have more financial stability and access to aid, while renters are more likely to be economically disadvantaged and face a higher risk of permanent displacement.

Social infrastructure and health disparities

Wealth disparities have significantly influenced hazard exposure. In general, wealthier people tend to occupy elevated areas, leaving the poor and working class facing more risks to flooding and environmental hazards (Bullard, 2008). Economically disadvantaged populations are more likely to reside in flood zones than outside at the national scale (Qiang, 2019). Collins et al. (2018) found that flood zones are disproportionately inhabited by socially vulnerable people in Houston as many coastal lands are used by petrochemical industries, while socially privileged groups in Miami expose themselves to residential flood risks by seeking coastal amenities. Before Hurricane Harvey, racial and ethnic minority communities, along with low SES groups, had limited access to resources for mitigating flood risks and preparing for disasters compared to White and higher-income populations (Flores et al., 2021). Also, these people faced larger challenges in recovering from Harvey due to the disproportionately physical and health impact (Flores et al., 2021). The financial burden of flood-related damages in the U.S. disproportionately affects economically disadvantaged communities (Wing et al., 2022). These vulnerable populations who live near to the pollution not only experience higher health risk, but also experience long term health issues after a hazard.

Klinenberg (2002; 2018) found that social isolation and disinvestment in public spaces directly contribute to higher mortality rates in disadvantaged neighbourhoods during heat waves. The study emphasized the power of **social infrastructure**, such as parks and community organizations, which indirectly protect people in environmental hazards. Wealthy neighborhoods normally have more robust social and cultural institutions, such as cooling centers, emergency information hubs, whereas under-resourced areas often lack such infrastructure reinforcing the health disparities in hazard contexts.

How has the concentration of economic resources influenced responses to Hazard?

Public assistance and inequitable distributions

Since last century, governments have expanded and institutionalized hazard responses, including the National Flood Insurance Program (NFIP) and the private insurance market. These forms of public assistance are designed primarily to restore property, or wealth, which is presumed to help re-establish individual, family, and community well-being both directly and indirectly (Howell & Elliott, 2019). By this, those with more property as well as more income with which to insure it are likely to experience significantly different recoveries than those with less property and income (Howell & Elliott, 2019). However, this approach inherently benefits those with greater economic resources that more privileged residents and property owners may gain access to new resources and opportunities that include new business prospects supported by **federal recovery investments** (Gotham 2014; Howell & Elliott, 2019). They also receive low-interest loans, significant payouts from public and private insurance policies, and opportunities to transfer wealth to future generations through financial windfalls, property restoration, and investment (Gotham 2014; Howell & Elliott, 2019). In addition, Roth et al. (2020) find that disasters on average lead to long term increase in per capita personal income and rising home prices, while employment and population remain unchanged. This finding suggests that the income boost may reflect productivity increases and greater demand for housing in supply-constrained areas with insurance and government aid, which are highly correlated with damages in recovery (Roth et al., 2020).

Post-disaster recovery and buyouts program

Homeowners with solid insurance coverage and sizable savings can initiate repairs faster, reinforcing neighborhood stability and enhancing community resilience in post-disaster recovery. With more economic resources, these people also have more flexibility to relocate if it's needed, and wealthier communities tend to recover more effectively. In contrast, lower income groups are more likely to experience financial burden, making it less likely for them to return.

To address long-term flood risks and reduce financial pressure on the NFIP, federal funding supports local government in implementing voluntary home buyouts programs in targeted areas of repetitive flooding (Loughran et al., 2019). These buyout programs aim to acquire properties in high risk areas and restore the land to natural conditions that can better absorb or redirect excess water in the future (Fraser et al., 2003; Loughran et al., 2019). Mach et al. (2019) find that local governments in wealthier and more populous counties are more likely to implement the federal buyout program, but within those counties, bought-out properties tend to be concentrated in neighborhoods of lower social privilege. In addition, Elliott et al. (2020) indicate that, controlling for local flood damage, population, and incomes, the buyout program disproportionately targets whiter counties and neighborhoods, especially in more urbanized areas where the program now concentrates.

Measurement challenges of wealth/damages/losses in the context of Hazard

Inability to quantify hazard losses

Most studies on hazard losses capture the incomplete picture by focusing on direct economic, human, or insured losses (Gall et al., 2011). There are two identified key trends in measuring hazard losses: a decline in human losses, and a rise in economic losses (Cutter et al., 2005; Smolka, 2006; Deg, 1992; Riebsame et al., 1986). Frequent hazards such as storms and heat waves often result in fatalities, particularly among vulnerable groups like the elderly, but these events are often categorized too broadly (Gall et al., 2011). The classification of hazards is shaped by database structures and input methods, making the loss assessment inaccurate (Gall et al., 2009).

Loss measurements are dominated by direct loss, such as property damage, while indirect loss remains under examined, similar to the use of insured losses over uninsured losses (Gall et al., 2011). This emphasis on immediate and quantifiable economic losses overlooks longer term social and environmental effects. In addition, many of these categories overlap, making it difficult to avoid double-counting (Gall et al., 2009; 2011).

The SHELATUS database is a valuable tool for tracking direct property and crop losses, but it has key shortcomings. It excludes indirect losses, uninsured damages, or adjusted original loss estimates. Its major purpose is georeferencing reported losses to analyze spatial and temporal patterns of disaster impact. However, the lack of data on non-natural hazards, uninsured losses, and long-term consequences make it challenging to develop complete and reliable loss measurement (Gall et al., 2011).

The need for multi-scale analysis

Howell & Elliott (2019) use a longitudinal, population-centered approach to assess the impacts of natural hazard damages and FEMA assistance on wealth inequality, demonstrating that wealth inequality and hazard damages are dynamically linked. However, this study did not consider the broader dimensions of recovery related to individual and social well-being, and only used broadly collected tax and insurance dollars which cannot capture a full picture of wealth inequality. Suss et al., (2024) introduce the Geographic Wealth Inequality Database (GEOWEALTH-US), which provides the first comprehensive estimates of wealth levels and distribution of wealth across multiple spatial scales within the United States from 1960 to 2020. This study indicates that inter-regional wealth disparities have grown much larger than inter-regional income disparities, underscore the shifting patterns of wealth concentration

across different geographic scales. It highlights the need for considering the spatial and temporal dimensions of wealth distribution to better understand hazard vulnerability.

References:

- Alvaredo, Facundo, Anthony B. Atkinson, Thomas Piketty, and Emmanuel Saez. 2013. "The Top 1 Percent in International and Historical Perspective." *Journal of Economic Perspectives* 27(3):3–20.
- Berke, P. (1982). Coastal Zone Management from an Administrative Perspective: A Case Study of Texas. *The American Review of Public Administration*, 16(2–3), 217–226. Scopus. <https://doi.org/10.1177/027507408201600208>
- Bullard, R. D. (2008). Differential vulnerabilities: Environmental and economic inequality and government response to unnatural disasters. *Social Research*, 75(3), 753–784. Scopus. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-67649509879&partnerID=40&md5=12cf45af80dbb252d61541eec5d4e08a>
- Campbell, S. (1996). Green Cities, Growing Cities, Just Cities?: Urban Planning and the Contradictions of Sustainable Development. In S. S. Fainstein & J. DeFilippis (Eds.), *Readings in Planning Theory* (pp. 214–240). John Wiley & Sons, Ltd. <https://doi.org/10.1002/9781119084679.ch11>
- Caschili, S., Reggiani, A. & Medda, F. (2015). Resilience and Vulnerability of Spatial Economic Networks. *Netw Spat Econ* 15, 205–210 <https://doi.org/10.1007/s11067-015-9283-9>
- Charles, Kerwin Kofi, and Erik Hurst. 2002. "The Transition to Home Ownership and the Black–White Wealth Gap." *Review of Economics and Statistics* 84(2):281–97.
- Collins, T. W., Grineski, S. E., & Chakraborty, J. (2018). Environmental injustice and flood risk: A conceptual model and case comparison of metropolitan Miami and Houston, USA. *Regional Environmental Change*, 18(2), 311–323. Scopus. <https://doi.org/10.1007/s10113-017-1121-9>
- Cutter, S.L.; Emrich, C.T. Are natural hazards and disaster losses in the U.S. increasing? *EOS Trans. Am. Geophys. Union* 2005, 86, 381, 388–389.
- Degg, M. Natural Disasters—Recent Trends and Future-Prospects. *Geography* 1992, 77, 198–209.
- Dietz, R. D., and D. R. Haurin. 2003. "The Social and Private Micro-Level Consequences of Homeownership." *Journal of Urban Economics* 54:401–50.
- Elliott, J. R., & Howell, J. (2016). Beyond Disasters: A Longitudinal Analysis of Natural Hazards' Unequal Impacts on Residential Instability. *Social Forces*. <https://doi.org/10.1093/sf/sow086>
- Elliott, J. R., Brown, P. L., & Loughran, K. (2020). Racial Inequities in the Federal Buyout of Flood-Prone Homes: A Nationwide Assessment of Environmental Adaptation. *Socius: Sociological Research for a Dynamic World*, 6, 2378023120905439. <https://doi.org/10.1177/2378023120905439>
- Elliott, James R., and Jeremy Pais. 2006. "Race, Class, and Hurricane Katrina: Social Differences in Human Responses to Disaster." *Social Science Research* 35(2):295–321.
- Elliott, James R., and Junia Howell. 2017. "Beyond Disasters: A Longitudinal Analysis of Natural Hazards' Unequal
- Flippen, Chenoa. 2004. "Unequal Returns to Housing Investments? A Study of Real Housing Appreciation among Black, White, and Hispanic Households." *Social Forces* 82(4):1523–51.

- Flores, A. B., Collins, T. W., Grineski, S. E., Griego, A. L., Mullen, C., Nadybal, S. M., Renteria, R., Rubio, R., Shaker, Y., & Trego, S. A. (2021). Environmental Injustice in the Disaster Cycle: Hurricane Harvey and the Texas Gulf Coast. *Environmental Justice*, 14(2), 146–158. Scopus. <https://doi.org/10.1089/env.2020.0039>
- Fox, Liana E. 2016. “Parental Wealth and the Black-White Mobility Gap in the U.S.” *Review of Income and Wealth* 62(4):706–723.
- Fraser, James, Rebecca Elmore, David Godschalk, and William Rohe. 2003. “Implementing Floodplain Land Acquisition Programs in Urban Localities.” Report prepared for the Federal Emergency Management Agency (FEMA) and the National Science Foundation. Chapel Hill, NC: The Center for Urban & Regional Studies, University of North Carolina at Chapel Hill.
- Fussell, E., & Harris, E. (2014). Homeownership and Housing Displacement After Hurricane Katrina Among Low-Income African-American Mothers in New Orleans. *Social Science Quarterly*, 95(4), 1086–1100. <https://doi.org/10.1111/ssqu.12114>
- Gall, M., Borden, K. A., & Cutter, S. L. (2009). When do losses count? Six fallacies of natural hazards loss data. *Bulletin of the American Meteorological Society*, 90(6), 799-810. <https://doi.org/10.1175/2008BAMS2721.1>
- Gall, M., Borden, K. A., Emrich, C. T., & Cutter, S. L. (2011). The unsustainable trend of natural hazard losses in the United States. *Sustainability*, 3(11), 2157-2181. <https://doi.org/10.3390/su3112157>
- Gotham, Kevin Fox. 2014. “Racialization and Rescaling: Post-Katrina Rebuilding and the Louisiana Road Home Program.” *International Journal of Urban and Regional Research* 38(3):773–790.
- Handy, S. L., & Niemeier, D. A. (1997). Measuring Accessibility: An Exploration of Issues and Alternatives. *Environment and Planning A: Economy and Space*, 29(7), 1175-1194. <https://doi.org/10.1068/a291175>
- Holway, J. M., & Burby, R. J. (1993). Reducing flood losses: Local planning and land use controls. *Journal - American Planning Association*, 59(2), 205–216. Scopus. <https://doi.org/10.1080/01944369308975869>
- Howell, J., & Elliott, J. R. (2019). Damages done: The longitudinal impacts of natural hazards on wealth inequality in the United States. *Social problems*, 66(3), 448-467.
- Howell, J., & Elliott, J. R. (2019). Damages Done: The Longitudinal Impacts of Natural Hazards on Wealth Inequality in the United States. *Social Problems*, 66(3), 448–467. <https://doi.org/10.1093/socpro/spy016>
- Iglesias, V., Braswell, A. E., Rossi, M. W., Joseph, M. B., McShane, C., Cattau, M., ... & Travis, W. R. (2021). Risky development: Increasing exposure to natural hazards in the United States. *Earth's future*, 9(7), e2020EF001795.
- Keister, Lisa A. 2014. “The One Percent.” *Annual Review of Sociology* 40:347–367.
- Kirby, H. R. (1976). Accessibility indices for abstract road networks. *Regional Studies*, 10(4), 479–482. <https://doi.org/10.1080/09595237600185491>
- Klinenberg, E. (2002). *Heat wave: A social autopsy of disaster in Chicago*. University of Chicago Press.
- Klinenberg, E. (2018). *Palaces for the people: how social infrastructure can help fight inequality, polarization, and the decline of civic life*. First edition. New York, Crown.

- Kousky, C., Palim, M., & Pan, Y. (2020). Flood Damage and Mortgage Credit Risk: A Case Study of Hurricane Harvey. *Journal of Housing Research*, 29(sup1), S86–S120.
- Kwan, M.-P. (1998). Space-Time and Integral Measures of Individual Accessibility: A Comparative Analysis Using a Point-based Framework. *Geographical Analysis*, 30: 191-216.
<https://doi.org/10.1111/j.1538-4632.1998.tb00396.x>
- Loughran, K., Elliott, J. R., & Kennedy, S. W. (2019). Urban Ecology in the Time of Climate Change: Houston, Flooding, and the Case of Federal Buyouts. *Social Currents*, 6(2), 121–140.
<https://doi.org/10.1177/2329496518797851>
- Mach, Katharine J., Caroline M. Kraan, Miyuki Hino, A. R. Siders, Erica M. Johnston, and Christopher B. Field. 2019. “Managed Retreat through Voluntary Buyouts of Flood-prone Properties.” *Science Advances* 5(10):1–9.
- Michael, Y. L., Smiley, K. T., Clay, L., Hirsch, J. A., & Lovasi, G. S. (2023). Uneven Growth in Social Capital Organizations After Disasters by Pre-Disaster Conditions in the United States 2000–2014. *Disaster Medicine and Public Health Preparedness*, 17, e278. <https://doi.org/10.1017/dmp.2022.230>
- Mileti, D. S. (1999). *Disasters by design a reassessment of natural hazards in the United States*. Joseph Henry Press.
- Oliver, Melvin L., & Thomas M. Shapiro. 2006. *Black Wealth/White Wealth*. New York: Routledge.
- Papilloud, T. & Keiler, M. (2021). Vulnerability patterns of road network to extreme floods based on accessibility measures. <https://doi.org/10.1016/j.trd.2021.103045>
- Paul, N., Galasso, C., & Baker, J. (2024). Household Displacement and Return in Disasters: A Review. *Natural Hazards Review*, 25(1), 03123006. <https://doi.org/10.1061/NHREFO.NHENG-1930>
- Qiang, Y. (2019). Disparities of population exposed to flood hazards in the United States. *Journal of Environmental Management*, 232, 295–304. Scopus. <https://doi.org/10.1016/j.jenvman.2018.11.039>
- Riebsame, W.E.; Diaz, H.F.; Moses, T.; Price, M. The social burden of weather and climate hazards. *Bull. Am. Meteorol. Soc.* 1986, 67, 1378-1388.
- Aaronson, Daniel. 2000. “A Note on the benefits of homeownership.” *Journal of Urban Economics* 47:356–69.
- Rossi, P. H. 1996. “The Social Benefits of Homeownership: Empirical Evidence from National Surveys.” *Housing Policy Debate* 7(1):1–35.
- Roth Tran, B., & Wilson, D. (2020). The Local Economic Impact of Natural Disasters. *Federal Reserve Bank of San Francisco, Working Paper Series*, 1.000-61. <https://doi.org/10.24148/wp2020-34>
- Shapiro, Thomas M. 2017. *Toxic Inequality: How America’s Wealth Gap Destroys Mobility, Deepens the Racial Divide, and Threatens Our Future*. New York: Basic Books.
- Shi, Y., Blainey S, Sun C, Jing P. (2020). A literature review on accessibility using bibliometric analysis techniques. *Journal of Transport Geography*. <https://doi.org/10.1016/j.jtrangeo.2020.102810>
- Smolka, A. Natural disasters and the challenge of extreme events: Risk management from an insurance perspective. *Philos. Trans. R. Soc. A* 2006, 364, 2147-2165.

- Suss, J., Kemeny, T., & Connor, D. S. (2024). GEOWEALTH-US: Spatial wealth inequality data for the United States, 1960–2020. *Scientific Data*, 11(1). Scopus. <https://doi.org/10.1038/s41597-024-03059-9>
- Vale, L. J. (2017). Urban design for urban development. In *The Profession of City Planning: Changes, Images, and Challenges: 1950-200* (pp. 220–223). Scopus. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85070822014&partnerID=40&md5=8057ff18c09696e36635a7720ff16956>
- Vigdor, Jacob. 2008. “The Economic Aftermath of Hurricane Katrina.” *Journal of Economic Perspectives* 22(4):134–145.
- Volscho, Thomas W., and Nathan J. Kelly. 2012. “The Rise of the Super-Rich Power Resources, Taxes, Financial Markets, and the Dynamics of the Top 1 Percent, 1949 to 2008.” *American Sociological Review* 77(5):679–99.
- Wing, O. E. J., Lehman, W., Bates, P. D., Sampson, C. C., Quinn, N., Smith, A. M., Neal, J. C., Porter, J. R., & Kousky, C. (2022). Inequitable patterns of US flood risk in the Anthropocene. *Nature Climate Change*, 12(2), 156–162. Scopus. <https://doi.org/10.1038/s41558-021-01265-6>