

WELL-BEING ASSESSMENT IN HAWAII CREATING COMMUNITY-LEVEL COMPOSITE INDICES IN PARADISE

BY

JONATHAN PAGE

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UNIVERSITY OF HAWAI'I AT MANOA 2424 MAILE WAY, ROOM 540 • HONOLULU, HAWAI'I 96822 WWW.UHERO.HAWAII.EDU

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Well-Being Assessment in Hawaii

Creating community-level composite indices in paradise

June 18, 2018

Jonathan Page, PhD

Research assistance: Aida Arik Thuy Doan

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Executive Summary

The purpose of this report is to provide the necessary foundation for the construction of a comparative well-being index for communities in Hawaii. We begin by comparing the composite index and dashboard approaches to describing well-being. We provide guidance on the selection of indicators, their normalization, the weighting of indicators to form a composite index, and the comparison of indices and indicator values across regions. Existing indices are compared to provide context. Available data sources are listed and opportunities to augment current data collection are identified. Specific recommendations are provided regarding the well-being model, data sources, indicator selection, interactive visualization, and communication.

Well-being can be explored through a composite index or as a dashboard of indicators. A comparative analysis of well-being in Hawaii should include both. The composite indices provide a high-level overview. The dashboard of indicators allows details to be examined on demand.

There is no consensus on what determines the best domains (i.e., dimensions of well-being) or indicators. Domains included in our analysis are economic opportunity, health, community security, education, institutions (governance), social capital, and housing. The selection of indicators and domains presented in this report should be viewed as tentative. To remain relevant they will need to be adapted to address questions of policy and general interest. The index methodology should be subject to biennial reviews.

A general framework for creating composite indices and an overall well-being index follows:

- 1) For each domain, identify a key indicator¹
- 2) Predict the key indicator using indicators within this domain and those believed to affect the key indicator, the predicted values are a composite indicator
- 3) Predict overall well-being as a function of the domain-level composite indices

¹ If the desired indicator is not observed, the key indicator should be the observed variable closest to the latent desired indicator.

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1 Background

1.1 Comparative Assessment of Well-Being

1.1.1 Well-being indices vs. indicators

Comparative assessments of well-being seek to compare the condition of people across locations (and perhaps time). Before comparing well-being we must first define it. Unfortunately, defining well-being is far from easy.

When asking a friend how they are doing, the response may cover a variety of topics. This multivalent nature of well-being has inspired the dashboard approach to comparing well-being. In the dashboard approach, those different topics (also called domains, dimensions or components) are all given their chance to shine. The strength of this approach is in the absolute respect for the multidimensional nature of the human experience. A core weakness in the dashboard approach is the difficulty of communicating a cohesive message around a large number of topics.

An alternative technique is to construct a composite index that combines the data we have on these different domains of well-being into a single number. Composite indices may also be made for the domains of our abstract notion of overall well-being. The goal of these composite indices is to be a digestible, tractable, efficient, policy-relevant measure of the condition of a population. It is easier to compare regions using a single measure than a multitude. If the index is well constructed it should facilitate policy discussions and decisions. These indices need to avoid the extremes of generality (i.e., not capturing policy relevant aspects of well-being) and specificity (e.g., applicable to only one particular policy question).

Providing both a set of composite indices and allowing users to explore the underlying domains and component indicators blends the best of both techniques.

1.1.2 Well-being composite indices

There are many examples of well-being assessment projects focused on providing a composite index to give an overall sense of well-being within a region. The UN's 2016 Human Development Report² presents and excellent survey of common methodologies for constructing well-being indices. This section discusses several of these well-being index projects and lists others we reviewed.

² <u>http://hdr.undp.org/sites/default/files/hdr2016_technical_notes.pdf</u>

The Social Science Research Council's Measure of America project³ produced an American Human Development Index, which closely follows the methods of the UN's Human Development Index. The Measure of America project stands out for their wealth of interactive tools and for applying the index creation techniques to create a complementary Opportunity Index. This provides a model for creating new indices to address new or unmet concerns. Their county profiles compare census tracts within a county.

The Legatum UK Prosperity Index is a good example of a comparative index covering local areas with many domains and component indicators.⁴ Some weaknesses are the ad hoc weighting of indicators to form a single index composite. Their approach is to begin with equal weighting across indicators, but allow the weights to be doubled or halved based on expert guidance on the relative importance of indicators. In the absence of sensitivity analysis, it is unclear how reliable this subjective approach will be.

The AARP Livability index stands out for its consideration of policies.⁵ Each domain initially receives a score based on indicators available across all regions. Then each region can score extra points by having policies that, in theory, target a core domain.

Other examples of well-being indices reviewed for this report that create composite indices include:

- OECD Regional Well-Being
 <u>https://www.oecdregionalwellbeing.org/assets/downloads/Regional-Well-Being-User-Gui</u>
 <u>de.pdf</u>
- Happy Planet Index
 <u>http://happyplanetindex.org/about#how</u>
- Maryland Genuine Progress Indicator <u>http://dnr.maryland.gov/mdgpi/Pages/what-is-the-GPI.aspx</u>
- Human Development Index
 <u>http://hdr.undp.org/sites/default/files/hdr2016_technical_notes_0.pdf</u>
- Child and Youth Well-Being Index http://www.soc.duke.edu/~cwi/
- Child Development Index
 <u>http://www.crin.org/en/docs/child-development-index.pdf</u>
- Human Poverty Index
 <u>http://hdr.undp.org/sites/default/files/hdr2016_technical_notes.pdf</u>
- Index of Social Health
 <u>http://iisp.vassar.edu/ish.html</u>
- Social Progress Index
 <u>https://www.socialprogressindex.com/assets/downloads/resources/en/English-2017-Social-Progress-Index-Methodology-Report_embargo-until-June-21-2017.pdf</u>

³ <u>http://www.measureofamerica.org/</u>

⁴ http://uk.prosperity.com/docs/2016/2016UKProsperityIndexMethodology.pdf

⁵ <u>https://livabilityindex.aarp.org/how-are-livability-scores-determined</u>

- National Accounts of Well-Being
 <u>http://www.nationalaccountsofwellbeing.org/</u>
- Opportunity Index
 <u>http://opportunityindex.org/wp-content/uploads/2017/12/Opportunity-Index-2017-Technic</u>
 <u>al-Supplement.pdf</u>
- Applied Geographic Solutions: Quality of Life Index
 <u>https://www.appliedgeographic.com/files/Snapsite2017A_Documents/AGS%20Quality%</u>
 <u>20of%20Life%20Indexes%20Methodology%202017.pdf</u>
- USDA Healthy Eating Index
 <u>https://www.cnpp.usda.gov/sites/default/files/healthy_eating_index/HEI2010-UpdatePap
 er.pdf</u>
- Index of Sustainable Economic Welfare
 <u>http://repec.deps.unisi.it/quaderni/449.pdf</u>
- National Welfare Index
 <u>http://www.fest-nwi.de/index.php/en/index</u>
- Environmental Performance Index
 <u>https://epi.envirocenter.yale.edu/2018-epi-report/methodology</u>
- Gross National Happiness
 <u>http://www.grossnationalhappiness.com/wp-content/uploads/2012/04/Short-GNH-Index-edited.pdf</u>
- Australian Unity Wellbeing Index
 <u>https://www.australianunity.com.au/media-centre/news-and-media/australian-unity-wellb</u>
 <u>eing-index-2016</u>
- US Best States
 <u>https://www.usnews.com/news/best-states/articles/methodology</u>
- Child Opportunity Index
 http://www.diversitydatakids.org/files/CHILDOI/DOCS/DDK_KIRWAN_CHILDOI_METH
 ODS.pdf
- Subjective Wellbeing Index (Dolan et al. 2011; Benjamin et al. 2014)
- The Economist Intelligence Unit's Liveability
 <u>https://www.smh.com.au/cqstatic/gxx1I4/LiveabilityReport2017.pdf</u>
- KIDS COUNT National Indicators <u>http://www.aecf.org/m/resourcedoc/AECF-KIDSCOUNTIndex-2012.pdf</u>
- The Healthy Eating Index <u>https://www.cnpp.usda.gov/sites/default/files/healthy_eating_index/HEI2010-UpdatePap</u> <u>er.pdf</u> <u>https://www.cnpp.usda.gov/sites/default/files/healthy_eating_index/HEI-2005TechnicalR</u> eport.pdf
- WHO-5 Well-Being Index
 <u>https://www.corc.uk.net/outcome-experience-measures/the-world-health-organisation-fiv</u>
 <u>e-well-being-index-who-5/</u>

- Worcester Economic Index
 <u>http://www1.assumption.edu/worcester-economic-indicators-project/methods-details/</u>
- Anholt-GfK Nation Brands Index
 <u>https://beta.gov.scot/publications/anholt-gfk-roper-nation-brands-index-sm-2016-report-s</u>
 <u>cotland/</u>
- Global Liveable Cities Index
 <u>(Giap et al. 2014)</u>
 <u>https://www.pecc.org/resources/infrastructure-1/2134-research-framework-on-global-live
 able-cities-index-a-sustainable-humanitarian-a-socially-inclusive-approach/file
 </u>
- Mercer Quality of Living Survey
 <u>https://www.mercer.com/newsroom/2018-quality-of-living-survey.html</u>
- Canadian Index of Well Being
 <u>https://uwaterloo.ca/canadian-index-wellbeing/reports/2016-canadian-index-wellbeing-na</u>
 <u>tional-report/appendix-b-ciw-methods</u>
- Health Equity Index
 <u>https://www.sdoh.org/about/hei</u>

1.1.3 Well-being indicators

The alternative approach of providing a dashboard of indicators allows a well-being project to focus more on collecting meaningful indicators than on the methodological minefield of creating a composite index. This approach gives a good sense of the breadth of data on well-being, but can be overwhelming. New users of indicator dashboards need a guide to help retrieve actionable information. Effective dashboards are paired with reports/visualizations highlighting interesting contrasts.

The Pasadena Quality of Life Index 2012 provides a dashboard of indicators and at times compares Pasadena to its neighbors.⁶ It stands out for its use of inferential measures of well-being.

The Long Island Index 2018 Indicators report⁷ is another example of the dashboard method. They group indicators within goals underneath their core domains of well-being. For example, within the Economy domain, they list the following goals: Growth and Prosperity, Supportive Business Environment, and Innovative Economy. Indicators within Growth and Prosperity are GDP, employment trends, growth in wages, industry clusters, and household income distribution.

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https://ww5.cityofpasadena.net/public-health/wp-content/uploads/sites/51/2017/02/Quality-of-Life-2012-Final-with-Links.pdf

⁷ <u>http://www.longislandindex.org/wp-content/uploads/2018/04/2018_Index_report_full_040518.pdf</u>

Other examples of well-being indices reviewed for this report that use the dashboard approach include:

- Calvert-Henderson Quality of Life Indicators
 <u>http://ethicalmarketsqualityoflife.com/backgrond-method/</u>
- Stiglitz, Sen, Fitoussi report http://ec.europa.eu/eurostat/documents/118025/118123/Fitoussi+Commission+report
- System of Environmental Economic Accounts <u>https://seea.un.org/content/about-seea</u>
- Sustainability Development Goals
 <u>https://unstats.un.org/sdgs/indicators/indicators-list/</u>
- National Neighborhood Indicators Partnership
 <u>https://www.neighborhoodindicators.org/activities/issues</u>
- Boston Indicator
 <u>http://www.bostonindicators.org/indicators</u>
- Community Indicators Victoria
 <u>http://www.communityindicators.net.au/indicator_metadata</u>
- The National Citizen Survey (HNL, 2017)
 <u>http://www.honolulu.gov/rep/site/oca/oca_docs/1-FY2017_The_NCS_Community_Livabil</u>
 ity_Report_Honolulu_2017.pdf
- The Social Health of the Nation (Miringoff and Miringoff 1999)
- Older Americans: Key indicators of Well Being <u>https://agingstats.gov/docs/LatestReport/Older-Americans-2016-Key-Indicators-of-WellB</u> <u>eing.pdf</u>
- America's Children: Key National Indicators of Well-Being <u>https://www.childstats.gov/americaschildren/index.asp</u>
- Baltimore Neighborhood Indicators Alliance
 <u>https://bniajfi.org/indicators/all</u>
- Eastern Tennessee Index http://etindex.org
- Quality of Life in Jacksonville: Indicators for Progress
 <u>https://issuu.com/jcci/docs/2012_qol_summary_document</u>
- Greater Portland Pulse
 <u>http://communityindicators.net/wp-content/uploads/2018/02/path_economic_prosperity.p</u>
 <u>df</u>
- Sustainable Seatle's Indicator (Indicators of Sustainable Community)
 <u>http://communityindicators.net/wp-content/uploads/2018/01/SustainableSeattleSustainab</u>
 <u>ilityReport2006.pdf</u>
- Oregon Progress Board <u>https://www.oregoncf.org/Templates/media/files/reports/2014/top_indicators_oregon_20</u> <u>14.pdf</u>
- Buncombe county (Asheville, NC) Sustainability Plan
 <u>https://www.buncombecounty.org/common/planning/sustainability-plan-update.pdf</u>

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- Tasmania Together
 <u>https://cities.infrastructure.gov.au/28435/documents/59652</u>
- Community Needs Assessment
 <u>http://newarkchange.org/projects/2012-community-needs-assessment/</u>
- Ecosystem and Human Well-being (The Millennium Ecosystem Assessment) http://www.millenniumassessment.org/documents/document.356.aspx.pdf

1.1.4 Other approaches

There are many more alternative conceptions of well-being and methods for assessing well-being than are presented within this report. <u>Coyle et al. (2017)</u> is a recent discussion of the alternatives to GDP, <u>Jones and Klenow (2016)</u> use equivalent compensation to compare well-being, and <u>Benjamin et al. (2014)</u> create a survey-based individual well-being index built on stated preference. The focus of this report is on a pragmatic approach to well-being assessment that builds on the dominant approaches in research and practice with a focus on Hawaii. Maslow's hierarchy of needs, the matrix of fundamental human needs, and Sen and Nussbaum's capabilities approach, among other important contributions to understanding well-being are not detailed in this report.

1.2 Common Well-Being Indicators by Domain

This section presents some common indicators of well-being in listed table 1 below. We briefly discuss several of these to indicate typical issues of measurement and interpretation. This list should not be considered exhaustive. The average well-being indicator project we surveyed included hundreds of indicators. A comprehensive analysis is beyond the scope of this report. Additional indicators are covered in section 2.1 on existing data.

Income per capita

Income per capita is frequently used as a general measure of well-being. This measure has many drawbacks. The per capita measure allows the aggregate (sum) of income to be compared across regions, but the per capita value may not be reflective of any one individual's or household's experience. Median income/earnings at least identifies a notion of the typical individual/household. Unfortunately, income/earnings itself misses the overall buying power of the household. Keeping income constant, households' consumption is still constrained by overall wealth (i.e., their full list of assets and liabilities). Beyond consumption many other factors affect well-being. As noted by <u>Deaton (2008</u>), in his analysis of the Gallup World Poll, an individual cannot always pay for better health, and health affects an individual's ability to enjoy their wealth.

Self-reported well-being

Self-reported well-being provides a window into how individuals see themselves, often in comparison to their community or to global norms. This measure typically falls within evaluative

well-being that has a longer time horizon than what we can observe from point-in-time observations of individuals' conditions. The Cantril ladder, used in the Gallup World Poll, is a common measurement and is discussed thoroughly by <u>Deaton (2008)</u> where he finds it has a consistent positive relationship with GDP per capita. As a survey measurement, self-reported well-being is expensive to collect and is often supplemented by other measures for small-area studies.⁸

Unemployment rate

The unemployment rate measures the proportion of the individuals in the labor force that are unemployed. This excludes the working-age population that has given up looking for work and the institutionalized population. This measure misses those that are stuck in part time work (underemployed). In general, there is a broad assumption that being employed is good, where job satisfaction varies greatly and employment does not always have a consistent effect on overall well-being.

Long-term unemployment

The OECD defines long-term unemployment as unemployment lasting at least one year.⁹ Long-term unemployment is self-reinforcing. Being without a job for an extended period makes the job-seeker less attractive to potential employers. Primary data on long-term unemployment for the US comes from the Bureau of Labor Statistics Current Population Survey. Estimates exist of the national and state level.

Median annual earnings

Median annual earnings identifies the amount where 50% of individuals/households make more and 50% make less. This avoids bias in a per capita measure when the top of the distribution sees growing income while the rest of the distribution stagnates. This measure is still limited and many other features of earnings are important to consider. What is the state of other sections of the income distribution (the bottom 20%, 10%, etc.)? What is the state of earnings inequality? Are earnings growing (and whose earnings are growing)? What are earnings expectations of new grads? What are earnings expectations in real terms for those on fixed incomes? This variable is estimated at low geographic aggregation making it attractive for inclusion.

Broadband speed/availability

Percent of households with broadband internet subscription is available from the ACS. Unfortunately there are no ready measures of speed/quality. The FCC has a map of broadband offerings that is useful for estimating speeds at the census tract level.¹⁰

⁸ See (<u>Brezzi and Ramirez 2016</u>) for a more recent look at well-being assessment at the subnational level using the Gallup World Poll.

⁹ https://data.oecd.org/unemp/long-term-unemployment-rate.htm

¹⁰ <u>https://broadbandmap.fcc.gov/</u>

Table 1. Common Well-Being Indicators by Domain

Indicator	Source for HI	Level of aggregation
Income per capita	ACS	Census tract
Self-reported well-being	SMS Survey, Gallup-Healthways Well-Being Index	SMS survey area, State
Unemployment rate	ACS	Census tract
Long-term unemployment rate	CPS	Metro area, State
Median annual earnings	ACS	Census tract
Broadband speed/availability	FCC	Any
Life expectancy at birth	IHME Estimates ¹¹	County
Obesity rate	500 Cities	Census tract
Self-reported health	500 Cities	Census tract
Violent (and property) crimes per capita	HPD	City-block/beat level
Years of schooling	ACS	Census tract
Educational attainment (% with college degree)	ACS	Census tract
Voter turnout	HI Office of Elections	State legislative district
Housing burden	ACS	Census tract
Can rely on friends/family?		
Housing affordability	ACS	Census tract

¹¹ The Institute for Health Metrics and Evaluation (IHME) "used small area estimation methods to produce annual life tables and calculate age-specific mortality risk at the county level for the United States. De-identified death records from the National Center for Health Statistics (NCHS) and population counts from the census bureau, NCHS, and the Human Mortality Database were used in the analysis." <u>http://ghdx.healthdata.org/record/united-states-life-expectancy-and-age-specific-mortality-risk-county-198</u> 0-2014

1.3 Building an Index

The OECD has developed a *Handbook on Constructing Composite Indicators: Methodology and User Guide*¹² that provides a comprehensive overview of how to build composite indices. This report will not attempt to recreate that tome, but will highlight core insights applicable to the creation of a well-being index for Hawaii.

1.3.1 Indicator selection

Indicator selection is driven by expert advice, policy targets, and data availability. Indicators should be selected because they give valuable information on substantive questions. Convenient indicators should be avoided when they have high potential for bias. For example, in the goal to reduce hunger, survey estimates on food security should be preferred to the count of school lunch provision. Using survey responses from the Current Population Survey, researchers at the US Department of Agriculture found 38% of food insecure households were not using the three largest Federal food and nutritional assistance programs (Coleman-Jensen et al. 2014). These households would be undercounted and their distribution untracked if we were simply relying on provision of public nutrition services.

A pragmatic approach is to start with common indicators that have well-defined connections to the well-being domains. The Legatum Institute uses a two-year methodological review cycle, freeing them to evolve their stable of indicators to meet policy and theoretical demands.

There are two basic approaches for selecting indicators for cross-community comparisons. Indicators can be selected directly by domain experts or selected by a data-driven process. These two approaches are often combined. It is easier to refine a shorter list, so either method may be used as an input to the other.¹³

Data-driven approach

Exploratory factor analysis can be used to reduce the dimensionality of the collected data on well-being. The resulting factors are either selected from among the initial indicators or constructed by combining existing indicators. (Shahumyan et al. 2017) use exploratory factor analysis to identify key indicators in order to cluster neighborhoods in Baltimore and Dublin.

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https://read.oecd-ilibrary.org/economics/handbook-on-constructing-composite-indicators-methodology-an d-user-guide_9789264043466-en

¹³ (<u>Decancq and Lugo 2013</u>) list three core categories which house distinct approaches to setting composite weights: data-driven (frequency, statistical, most-favorable), normative (equal or arbitrary, expert opinion, price based), and hybrid (self-stated, hedonic).

1.3.2 Indicator normalization

Since indicator values are often incomparable (e.g., proportions and dollar amounts), indicators are normalized to either allow direct comparison or as a preparation step in the formation of a composite index. In each case the direction of well-being must be considered, since, for example, lower unemployment and higher income are both desirable.

Min-max normalization

One of the most common normalization techniques is min-max normalization. This normalization subtracts the minimum value and divides by the difference between the min and the max. Take life expectancy as an example, if the minimum life expectancy value is 50 and the maximum is 90, then a region with a life expectancy of 70 would have a score of 0.5 = (70 - 50)/40. The Legatum Prosperity Index uses this procedure where it is called a distance-to-frontier score¹⁴.

Z-score normalization

The Child Opportunity Index,¹⁵ among others, uses z-score normalization to allow regions to be compared in terms of typical variation in each indicator. For normally distributed data, a z-score of 1 means the value is one standard deviation larger than the mean, a z-score of -1 indicates the value is one standard deviation smaller than the mean, and a z-score of 0 indicates the value is the mean value. The nice interpretability of z-score normalization only applies for normally distributed data. For many of the indicator values of interest, this is not the case.

Percentile normalization

The Applied Geographic Systems Quality of Life Index assigns for each indicator a rank to each census block group. That rank is then scaled to range from 0 to 1000. This normalization has the advantage of presenting distributional information without the need for distributional assumptions. Using the percentile rank directly, a region with an unemployment percentile rank of 50 would have unemployment lower than 50% of regions. In contrast, the same conclusion only applies to z-score normalization (for a z-score value of 0) when the underlying data is normally distributed.

This normalization focuses attention on relative performance vs. absolute performance. In a society where everyone has a high level of well-being, the individual with the lowest levels would still look poor when using a percentile normalization.

(https://www.socialprogressindex.com/assets/downloads/resources/en/English-2017-Social-Progress-Ind ex-Methodology-Report_embargo-until-June-21-2017.pdf), the UN's Human Development Index (http://hdr.undp.org/sites/default/files/hdr2016_technical_notes_0.pdf) and many others.

¹⁴ See

<u>http://prosperitysite.s3-accelerate.amazonaws.com/9615/1186/6075/Legatum_Prosperity_Index_2017_M</u> <u>ethodology_Report.pdf</u>. Min-max normalization is also used by the OCED Regional Well-Being index (<u>https://www.oecdregionalwellbeing.org/assets/downloads/Regional-Well-Being-User-Guide.pdf</u>), the Social Progress Index

¹⁵ <u>http://www.diversitydatakids.org/files/CHILDOI/DOCS/DDK_KIRWAN_CHILDOI_METHODS.pdf</u>

Rate-of-change normalization

The Canadian Index Wellbeing uses a common base year for each indicator and sets the value in the base year to 100.¹⁶ So, in the current year if the value of the health indicator is 120, we know the current health measurement is 20% higher than the measurement in the base year.

Headcount normalization

Continuous variables, like income, can be transformed into a headcount measure by counting the number of individuals or households with income above a designated threshold. This is a particularly important normalization, since thresholds are common policy levers (e.g., determining eligibility for Section 8 housing, free and reduced lunch, etc.). This normalization has the ability to focus on absolute levels of well-being. If the threshold is set based on a percentile (like for Section 8 housing), the headcount normalization gives a relative measure. If the threshold is determined outside of the observed values, it can be considered an absolute measure of well-being. The proportion of households with at least one person unemployed is an example of an absolute measure of economic opportunity.

1.3.3 Weighting methods

Within a composite index, understanding the weighting of the components is fundamental to understanding what can explain differences across areas. Simple equal weighting will bias the index towards any correlated components. If the components are orthogonal (i.e., not correlated), equal weighting implies that each component is equally important. The key here is to note that even a seemingly fair weighting makes an assumption about relative importance.

Weighting also interacts with choice of indicator normalization. With equal weighting, z-score normalization assumes that the standard deviation across indicators has the same importance in determining the composite index. With percentile normalization, relative position is what is compared and each step in percentile rank would be considered equal across indicators with equal weighting.

When a subjective (or an objective) measure of well-being is available, using regression methods to predict well-being can produce weights consistent with the chosen well-being measure. In the absence of a well-defined objective function, the weighting will imply a latent well-being variable that may or may not reflect actual notions of well-being.

The OECD Better Life Index web application allows users to manually adjust the weights across domains.¹⁷ This approach is honest with the fact that in the absence of an objective function,

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https://uwaterloo.ca/canadian-index-wellbeing/reports/2016-canadian-index-wellbeing-national-report/app endix-b-ciw-methods

¹⁷ http://www.oecdbetterlifeindex.org/

there are no known optimal weights. In practice, simple equal weighting across domains is the most common approach.

1.3.4 Comparing communities

There are many different ways in which communities can be established and defined. Communities are established through common association. Individuals associate themselves with others based on location, race, gender, age, employment, education, interests, etc. For administrative convenience communities are often defined geographically within discrete boundaries, however, communities with which individuals identify may not be geographically bound. It is therefore important to consider the appropriate pairing of community unit with index. As an example, <u>Shelton et al. (2015)</u> use Twitter geotagged data to find that the locations of individuals identifying with a certain geographic community do not fit neatly, or consistently, within that community's historical boundaries. The fuzzy, overlapping nature of notions of community and neighborhood mean that any fixed boundaries imposed are fixed for convenience. Ideally, a well-being comparison application could allow for user-defined boundaries. Microsimulation approaches built on available micro data (discussed in section 1.3.5 below) can facilitate generating estimates for these ad hoc boundaries.

Census tracts are designed to be stable to facilitate comparisons over time. They typically contain between 1,200 and 8,000 people.¹⁸ Because of the wealth of demographic information available in the ACS and the wealth of general statistics available at the census tract, it is a natural target geography for a small-area well-being index. We recommend creating estimates at the census-tract level and providing a geographic crosswalk to translate the estimates to other desirable geographies (e.g., school district, legislative district, island, county, etc.). Estimates at higher levels of geographic aggregation can also be estimated directly as an additional project output.

When data is not available at the census-tract level, care must be taken in estimating disaggregated indicator values. ESRI's approach takes these household-level observations and assigns households in a census tract a value based on their demographic and socioeconomic characteristics.¹⁹ This approach implies that the only way to change the indicator values is to change the demographic/socioeconomic characteristics of the census tract. When a census tract is poor and unhealthy, the policy answer can't be to reduce the number of individuals outside of prime working age. As a result, the focus should be on statistics that are measured at a sufficiently small level of aggregation while using broader household surveys to help flesh-out our understanding of well-being, intersectionality, and the complexity of experiences.

For each well-being domain, inequalities across non-geographic communities are important to consider. In Hawaii, Marshallese have civilian unemployment rates more than twice the state

¹⁸ https://www.census.gov/geo/reference/gtc/gtc_ct.html

¹⁹ See <u>Tarozzi and Deaton (2009)</u> for a critique of this approach focusing on small-area estimation of poverty levels.

average rate.²⁰ Identifying disparities in well-being can create natural policy targets (e.g., improving the state of Marshallese employment). In general, highlighting inequalities and recognizing the intersectionality of well-being will lead to a more nuanced index that has flexibility to address a wide array of issues. Further, tracking these inequalities across time will help identify systemic barriers to mobility for disadvantaged communities.

1.3.5 Micro Indicators

Public use (and restricted use) micro samples of large surveys present additional opportunities for understanding the multidimensional nature of well-being and its complement, deprivation. While the ACS provides useful breakdowns, like income summaries by sex, household characteristics, race, etc., this is a limited view of multidimensionality/intersectionality. Using household-level responses we can identify how many households have met well-being thresholds across a number of domains (this is a version of the Alkire-Foster Multidimensional Poverty Index (Alkire et al. 2015)). This measurement is also referred to as a double-cutoff, since we would first specify the number of domains in which households need to meet the domain-level threshold in order to be considered multidimensionally well (or deprived).

In order to get a more granular picture of well-being, microsimulation can complement existing micro data to take, for example, the relatively large Public Use Micro Areas (PUMAs) to generate census tract estimates.²¹ One caveat with microsimulation methods is their reliance on the factors used to match individual/household draws to census tracts. These methods will typically calibrate their microsimulation using certain demographic features like gender, race, age, and family size.²² This approach implicitly ties any subsequent analysis to these demographic features. An example implication is that well-being depends on race, which is perhaps a result, but may not get to the root of inequalities. These demographic features are also not feasible or desirable as policy levers.

²⁰ See <u>DBEDT (2018)</u>, "Demographic, Social, Economic, and Housing Characteristics for Selected Race Groups in Hawaii."

²¹ See <u>Choupani and Mamdoohi (2016)</u> for a review of population synthesis and other microsimulation approaches.

²² As an example, <u>Dwyer-Lindgren et al. (2017)</u> use small area estimation to create life expectancy estimates at the county level where estimates are driven by "7 covariates (the proportion of the adult population who graduated high school; the proportion of the population that is Hispanic; the proportion of the population that is black; the proportion of the population that is a race other than black or white; the proportion of a county that is contained within a state or federal Native American reservation; the median household income; and the population density)."

1.4 Well-Being Index Communication

1.4.1 Selecting communication media

A successful well-being index will have a high penetration rate with its intended audience. To reach the general public, infographics, interactive visualizations, and blog posts will be more effective than an isolated white paper. Creating content designed for social media consumption and sharing will help increase the spread of information.

1.4.2. Interactive examples

There are many examples of interactive applications as communication tools for well-being indices. This section discusses a handful of the best examples. Table 2 below lists other interactive applications for well-being indices reviewed for this report.

Table 2. List of Interactive Well-Being Index Applications

<u>Well-Being Index</u>	In
OECD Regional Well-Being	<u>ht</u>
Happy Planet Index	ht
Genuine Progress Indicator	ht
Measure of America	ht
Human Development Index	ht
	<u>n</u>
Social Progress Index	ht

Long Island Index Prosperity in the UK (Legatum) AARP Livability Scores Opportunity Index National Welfare Index Sustainability Development Goals Environmental Performance Index Community Indicators Victoria Australian Unity Wellbeing Index

US Best States Child Opportunity Index KIDS COUNT National Indicators Baltimore Neighborhood Indicators Alliance Oregon Progress Board

Interactive Application Link

ttps://www.oecdregionalwellbeing.org/ ttp://happyplanetindex.org/ ttp://dnr.maryland.gov/mdgpi/Pages/Calculator.aspx ttp://www.measureofamerica.org/maps/ ttps://ourworldindata.org/grapher/human-development-i dex?year=2014&country=USA ttps://www.socialprogressindex.com/ http://www.longislandindexmaps.org/ http://uk.prosperity.com/ https://livabilityindex.aarp.org/ https://opportunityindex.org/ http://www.fest-nwi.de/index.php/en/home https://sustainabledevelopment.un.org/?menu=1300 https://epi.envirocenter.yale.edu/results-overview http://www.communityindicators.net.au/lga profiles https://australianunity.au1.gualtrics.com/jfe/form/SV_3Wr r9BX1iBvSJfL https://www.usnews.com/news/best-states/data-explorer http://www.diversitydatakids.org/ https://datacenter.kidscount.org/ https://bniajfi.org/vital_signs/ http://oe.oregonexplorer.info/rural/CommunitiesReporter/ TopIndicators

The Measure of America project offers a suite of interactive tools.²³ They feature an interactive map allowing the direct selection of census tracts for some metro areas (see figure 1). Unfortunately, these rely on Flash. Tools that rely on plugins are unlikely to work on mobile devices and consumers may feel uncomfortable installing these plugins. Users without Flash receive the disappointing "Alternative content" (see figure 2).



Figure 1. Mapping the Measure of America: http://www.measureofamerica.org/maps/



Figure 2. Mapping the Measure of America (without Flash)

²³ <u>http://www.measureofamerica.org/tools/</u>

The OECD Better Life Index²⁴ does a fantastic job making it easy for users to adjust the weights combining domain indices into one composite index of well-being (see figure 3). This ability to adjust the weights is honest with the fact that no choice of weights will best answer every policy question. Another standout feature of their website, is displaying distributions of each component indicator on the domain pages (see figure 4). The combination of a narrative describing the connection between each component indicator within each domain provides extra details to those that want to know more.



numbers of GDP and economic

Figure 3. OECD Better Life Index (weights inset)

Housing

Background

Living in satisfactory housing conditions is one of the most important aspects of people's lives. Housing is essential to meet basic needs, such as shelter, but it is not just a question of four walls and a roof. Housing should offer a place to sleep and rest where people feel safe and have privacy and personal space; somewhere they can raise a family. All of these elements help make a house a home. And of course there is the question whether people can afford adeouate housing.

Rooms per person and dwellings with basic facilities

When looking at housing, it is important to examine living conditions, such as the average number of rooms shared per person and whether dwellings have access to basic facilities. The number of rooms in a dwelling, divided by the number of persons living there, indicates whether residents are living in crowded conditions. Overcrowded housing may have a negative impact on physical and mental health, relations with others, and children's development. In addition, dense living conditions are often a sign of inadequate water and sewage

Housing expenditure

Housing costs take up a large share of the household budget and represent the largest single expenditure for many individuals and families, by the time you add up elements such as rent, gas, electricity, water, furniture and repairs. In the OECD, households on average spend around 21% of their gross adjusted disposable income on keeping a roof over their heads. The level of housing costs in household budgets Varies from 26% in New Zealand to 15% in Korea. In Latvia and the Russian Federation, spending on housing also accounts for 23% and 19% of the household budget, respectively.

Housir	ng	0
Indic	cators	
Housir	ng expenditure	0
Dwelli	ings with basic facil	ities ()
Room	s per person	0

OECD Economic Outlook, Volume 2015 Issue 1 → more

Figure 4. OECD Better Life Index. Domain details

²⁴ <u>http://www.oecdbetterlifeindex.org/topics/housing/</u>

The OECD Regional Well-Being interactive²⁵ allows users to select an area and see areas that have well-being domain scores that are similar. The region selector requires the user to know the name of the region to compare, which would not be effective for census tracts. Allowing users to input an address/ZIP-code or click an area on a map would be a more effective mechanism allowing users to select specific census tracts. Each domain is displayed as a petal in a visual symbol similar to a flower (see figure 5). Clicking on an individual petal displays where the currently selected region falls in the distribution of the clicked domain.



Figure 5. OECD Regional Well-Being

²⁵ <u>https://www.oecdregionalwellbeing.org/</u>

The Maryland Genuine Progress Indicator Calculators are a pair of web forms that allow users to change the observed values for Maryland to estimate new index values for their economic, environmental, and social domains (see figure 6). The idea of letting users play around with indicator values to get a better sense of how changes to underlying indicators (like income inequality) affect the overall index values is attractive. Unfortunately, without knowing reasonable values to enter, this calculator can convey very little meaning. Further the calculator has an outdated UI both in design and functionality.

Maryland's Genuine Progress Indicator Calculators

Statewide Calculator

Citizen Calculator

Be Maryland's Sustainability Czar and enter various numbers into the MD-GPI to create Sustainability Scenarios. See how changes in your home and on your property could, if adopted by other Marylanders, impact the State's well-being.



Figure 6. Maryland's Genuine Progress Indicator Calculators.

The Social Progress Index²⁶ presents county level indicators in a scorecard that helps users visually identify strong/weak domains (see figure 7).

Denmark 🔻					20 [.] GD	17 Soc P PPF	ial Progre Per capit	score/value ss Index 90.57/100 a \$44,042	ran 1/12 10/12	k 8 28	
The scorecard highlights a country's dot where the country performs com data to make a judgment. Elements r	relative stre paratively w narked with	ngths a rell, a re a blue i	nd relative d dot wher ring are are	weaknesses compared to 15 peer cou e it performs relatively poorly, a yellow as where the country slightly over-perf	ntries with a dot where it forms while a	similar is perfo areas w	GDP per ca rmance is a rhere the co	apita. Elements of the Social Progress In average for its peer group, and a gray d suntry slightly under-performs are mark	ndex are ma ot when the ed with red	arked w ere isn't ring.	ith a blue sufficien
	score/ value	rank	strength/ weakness		score/ value	rank	strength/ weakness		score/ value	rank	strength/ weaknes:
Basic Human Needs	96.79	1	0	Foundations of Wellbeing	90.86	5	0	Opportunity	84.06	8	•
Nutrition and Basic Medical	99.28	19	•	Access to Basic Knowledge	98.49	18		Personal Rights	97.89	1	
Care				Adult literacy rate	No c	lata	•	Political rights	40.00	1	
Undernourishment	5.00	1		Primary school enrollment	99 <mark>.5</mark> 4	25		Freedom of expression	16.00	1	
Depth of food deficit	8.00	1		Secondary school enrollment	100.00	1		Freedom of assembly	0.97	1	•
Maternal mortality rate	6.50	19		Gender parity in secondary enrollm	ent 0.04	52	•	Private property rights	95.00	1	
Child mortality rate	3.50	11									
Deaths from infectious diseases	27.09	42		Access to Information and Communications	95.64	2	•	Personal Freedom and Choice	89.83	2	
Water and Sanitation	99.87	9		Mobile telephone subscriptions	100.00	1		Freedom over life choices	94.82	3	
Access to piped water	100.00	1		Internet users	96.33	3	•	Freedom of religion	3.00	54	•
Rural access to improved water	100.00	1		Press Freedom Index	8.89	4		Early marriage	0.00	1	
source								Satisfied demand for contraception	80.40	36	
Access to improved sanitation facilities	99.60	15		Health and Wellness	77.91	26	0	Corruption	90.00	1	•
				Life expectancy at 60	22.26	20					

Figure 7. Social Progress Index Scorecard

²⁶ <u>https://www.socialprogressindex.com/</u>

The Long Island Index Map allows users to search by village or address. For a selected address users see a list on the left of all the containing geographic boundaries: census block group, village/hamlet, town, county, county legislative district, state assembly district, state senate district and US congressional district. In addition to standard political boundaries, their map includes service provider districts for fire, ambulance, garbage, library, police, school, and water. They make use of CartoDB, which has an impressive suite for geographic visualization.²⁷



Figure 8. Long Island Index Map

1.4.3 Measuring impact

To measure the impact of the well-being index, attention should be paid to both unique visitors and social shares. Using the Facebook Pixel and Google Analytics will streamline the measurement of site visitors and identifying demographic patterns. Facebook can be leveraged to retarget Hawaii residents that have viewed the index and to survey them for feedback on the index. Retargeting can be used to drive overall engagement, but should be used with caution as

²⁷ https://carto.com/builder/

consumers become either desensitized to advertising personalization or offended by the perceived invasion of privacy.

1.5 The Current State of Well-Being Indices

Well-being measurement is a complex and evolving area of active research. The Social Indicators Research journal is dedicated to the study of the quality of life and should be periodically reviewed in coordination with any methodological update to this project.²⁸ For example, a recent article, analyzed the OECD Better Life Index using PCA and k-means clustering to provide another view into the patterns revealed by the multidimensional approach (do Carvalhal Monteiro et al. 2018). Using this approach we could show, for example, that the financial district and Kakaako are multidimensionally similar and belong to a group of census tracts with multidimensional well-being values that distinguish them from other census tracts.

Across the indices we surveyed most left out important details of indicator selection, normalization, and weighting to form composite indices. Among those that detailed their approach, min-max normalization was the most popular normalization of individual indicators. To combine normalized indicators into a composite index most projects used simple averaging (i.e., equal weighting).

In terms of communication, while we can observe the output from many of these projects it is not feasible to measure their effect on the policy landscape. To maximize the impact of an interactive display of a well-being index it is important to use web technologies that are mobile friendly and as future proof as possible (e.g., Measure of America's reliance on Flash)

1.6 Opportunities for Measuring Well-Being in Hawaii

Including subjective indicators helps to reflect community concerns not naturally covered by the more standard objective measures.²⁹ In general, these subjective measures can help point to issues with objective measures of well-being and with the weighting of composite indices.

The AARP Livability Score³⁰ includes policies as factors that can increase the livability score of a region. While it is not clear how to effectively quantify the impact of policies in general, the inclusion of relevant/related policies alongside the presentation of objectively measured well-being factors is a powerful tool for policy advocacy.

²⁸ <u>https://link.springer.com/journal/11205</u>

²⁹ Examples: The Australian Unity Wellbeing Index

^{(&}lt;u>https://www.australianunity.com.au/media-centre/news-and-media/australian-unity-wellbeing-index-2016</u>) and Bhutan's Gross National Happiness

⁽http://www.grossnationalhappiness.com/wp-content/uploads/2012/04/Short-GNH-Index-edited.pdf).

³⁰ https://livabilityindex.aarp.org/how-are-livability-scores-determined

Among the well-being indices we surveyed the OECD Regional Well-Being,³¹ the Genuine Progress Indicator (Maryland),³² the Happy Planet Index,³³ the Child Opportunity Index,³⁴ and the AARP Livability Scores stood out for their comprehensive coverage of many factors that impact the quality of life. These indices also feature well-documented methodology sections or white papers.

2 **Opportunities**

2.1 Existing data

2.1.1 The well-being model

The well-being domains identified in this report overlap closely with those in the Legatum Institute Indices, the OECD Better Life Index, and others:

Hawaii Well-Being Index Domains

- Economic Opportunity
- Health
- Community Security
- Education
- Institutions (Governance)
- Social Capital
- Housing

Comparison of these domains to those in a recent index of multiple of deprivation provides a useful framework for discussing the advantages and drawbacks of the current approach. Exeter et al. (2017) describe the New Zealand Indices of Multiple Deprivation (NZIMD). Phillips et al. (2016) survey indices of multiple deprivation since Townsend (1987) and argue for their use in the US. This list of domains is reflective of indices of multiple deprivation in other countries:³⁵

Indices of Multiple Deprivation Domains

- Employment
 - HWB: Economic Opportunity

³¹ <u>https://www.oecdregionalwellbeing.org/assets/downloads/Regional-Well-Being-User-Guide.pdf</u>

³² <u>http://dnr.maryland.gov/mdgpi/Pages/what-is-the-GPI.aspx</u>

³³ <u>http://happyplanetindex.org/about#how</u>

³⁴ <u>http://www.diversitydatakids.org/files/CHILDOI/DOCS/DDK_KIRWAN_CHILDOI_METHODS.pdf</u>

³⁵ English Indices of Multiple Deprivation:

<u>https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015;</u> review of indices of multiple deprivation and recommendations for the US (<u>Phillips et al. 2016</u>); Area Deprivation Index for the US: <u>https://www.hipxchange.org/ADI</u>;

- Income
 - HWB: Economic Opportunity
- Crime
 - HWB: Community Security
- Housing
 - $\circ \quad \text{HWB: Housing} \quad$
- Health
 - HWB: Health
- Education
 - HWB: Education
- Access
 - HWB: Institutions (Governance)

Compared to the NZIMD, the Hawaii Well-Being domains add social capital as a primary concern and collapse employment and income into economic opportunity.

The lack of a domain focused on environment means that the Institutions (Governance) and Community Security domains will have to cover the base of differential access to public parks/environmental amenities. Likelihood of impact by floods, wind damage are other examples of local factors that could fit within Community Security, but are distinct from crime and could be considered part of an Environment domain.

2.1.2 Cross-cutting datasets

American Community Survey

https://factfinder.census.gov/

The US Census Bureau's American Community Survey provides detailed estimates of population and housing characteristics at the census tract-level

2.1.3 Economic Opportunity

HI DOTAX

State of Hawaii Department of Taxation is able to create aggregate measures of income and income inequality as reported on tax returns, similar to those generated by the IRS at the zip code level:

https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-statistics-zip-code-data-soi DOTAX could generate these statistics at the census tract level to provide an administrative validation of the estimates from the ACS. DOTAX could also help create measures of income growth at the census-tract level.

ACS

https://factfinder.census.gov/

The American Community Survey provides an array of survey estimates at the census-tract level including Income, income inequality, labor market status, business income, commute time to work, WIC, SNAP, and other social services utilization.

BEST Index

http://www.basiceconomicsecurity.org/best/families.aspx

The Institute for Women's Policy Research and the National Council on Aging have developed the Basic Economic Security Tables (BEST) index to measure the income a working adult would need to meet their basic needs in select cities, counties, and states. The earnings needed are calculated for a wide variety of family compositions. These benchmarks could be used to get a headcount of households with sufficient earnings based on public use microdata from the ACS. Microsimulation approaches could be used to derive estimates of the headcount for regions smaller than the US Census Public Use Micro Areas (PUMAs).

HI DOE Hawaii Child Nutrition Programs

http://hcnp.hawaii.gov/overview/nslp/

Fiscal reports indicate the count of children in each school eligible for free/reduced lunch.

Consumer Expenditure Survey

https://www.bls.gov/cex/

This household survey provides valuable data on household consumption patterns. Used by Maryland's Genuine Progress Indicator³⁶ to get a sense of how consumption relates to other household features.

ESRI

https://doc.arcgis.com/en/esri-demographics/data/us-intro.htm

Household Budget Expenditures, Household Investments, Defensive Expenditures [These data are household expenditures classified as defensive expenditures taken from the ESRI consumer database. Categories of defensive expenditures are costs of medical care, costs of legal services, costs of food and energy waste, household pollution abatement, insurance, welfare neutral goods (tobacco and 25% of alcohol), household security and costs of family changes (alimony and child support).].

LEHD Employment Statistics

https://lehd.ces.census.gov/data/#lodes

LEHD Origin-Destination Employment Statistics (LODES) Data is currently available for the years 2002-2015 at the census block level. It covers basic statistics on employee counts by place of work and/or home census block. See <u>Graham et al. (2014)</u> for a comparison of commuting statistics in the ACS and LODES.

³⁶ <u>http://dnr.maryland.gov/mdgpi/Pages/default.aspx</u>

2.1.4 Health

CDC 500 Cities Project

The CDC's 500 Cities project includes Honolulu with estimates for various health indicators at the census tract level. This includes a self-rated health measure: "14 or more days when physical (or mental) health was not good in the past 30 days." <u>https://www.cdc.gov/500Cities/</u>

Hawaii Health Data Warehouse

http://ibis.hhdw.org/ibisph-view/query/builder/brfss/HealthStat2Lvl/HealthStat2LvlCrude11_.html Behavioral Risk Factor Surveillance System, including self-reported health status by community/school complex. This is at a higher level of aggregation, but is useful for modeling the nature of health in Hawaii. It includes the Pregnancy Risk Assessment Monitoring System, the Youth Risk Behavior Survey, and a proposed section on Vital Statistics,

UH Pacific Health Informatics Data Center (PHIDC)

http://ssri.manoa.hawaii.edu/tasi-phidc/

PHIDC administers the Hawai[•]i All-Payer Claims Database, which holds the promise of detailed geographic and demographic insights into healthcare provision in Hawaii.

Hawaii GIS

http://planning.hawaii.gov/gis/download-gis-data/ Provides locations of hospitals

2.1.5 Community Security

Honolulu Police Department (HPD) Offenses by Beat

http://www.honolulupd.org/information/index.php?page=statistics http://honolulupd.org/downloads/HPD2016annualreport.pdf

HPD Crime Incidents

https://data.honolulu.gov/dataset/HPD-Crime-Incidents/f5dd-pqys

HPD Crime Mapper

https://www.crimemapping.com/map/agency/165

HPD Traffic Information

http://www4.honolulu.gov/hpdtraffic/

National Archive of Criminal Justice Data

https://www.icpsr.umich.edu/icpsrweb/content/NACJD/index.html

The NACJD provides access to the FBI's Uniform Crime Reporting data for counties and cities. This data can augment that which is available from the local law enforcement statistics.

Adverse Childhood Experiences (ACE) BRFSS Module

https://www.cdc.gov/violenceprevention/acestudy/ace_brfss.html

The Hawaii BRFSS includes the ACE module for some years, which can be used to model at-risk homes. The module asks questions of respondents intended to cover their first 18 years of life.

Housing with Flood Risk

http://gis.hawaiinfip.org/FHAT/, http://dlnreng.hawaii.gov/nfip/floodmaps/

Evapotranspiration of Hawai'i

(Giambelluca et al. 2014) provide raster GIS data available at 250 m resolution, which can be aggregated up to the census-tract level (<u>http://solar.geography.hawaii.edu/downloads.html</u>). Layers include solar radiation, leaf area index, and air temperature.

2.1.6 Education

Hawaii State Department of Education

http://www.hawaiipublicschools.org/VisionForSuccess/SchoolDataAndReports/HawaiiEdData/P ages/HI-Data.aspx

School enrollment and performance data.

Hawaii State Office of Planning: School Areas

http://geoportal.hawaii.gov/datasets/high-school-areas http://geoportal.hawaii.gov/datasets/elementary-school-areas http://geoportal.hawaii.gov/datasets/elementary-school-areas The school-level areas are rolled up into associated school-complex areas: http://geoportal.hawaii.gov/datasets/school-complex-areas Which are then rolled up into school districts: http://geoportal.hawaii.gov/datasets/school-complex-areas The low-level school boundaries give finer detail on community affiliation based on school assignment.

ACS

The ACS provides measures of education level as well as average earnings by education level. This provides insight into both the level of education and how highly valued the education of a region is.

Hawaii State Public Library System

The annual reports of the Hawaii State Public Library System reports allocations to each branch. The value of these allocations is inversely proportional to the distance of residents to these locations. <u>http://www.librarieshawaii.org/about-us/reports/annual-reports/</u>

Historical circulation by branch:

https://data.hawaii.gov/Formal-Education/Libraries-Circulation-Activity-1984-2011/ky64-e4mx/da ta

Branch level statistics (2011-2014): http://www.librarieshawaii.org/about-us/reports/fact-sheets/

2.1.7 Institutions (Governance)

State of Hawaii Office of Elections: Voter turnout http://elections.hawaii.gov/election-results/ Hawaii voter turnout by state legislative district

State Legislative Data

https://dataverse.harvard.edu/dataverse/cklarner

Carl Klarner has compiled a dataset of state legislative elections from 1967-2012. The Princeton Gerrymandering Project extended that set out to 2016 using Ballotpedia: <u>http://election.princeton.edu/2017/09/26/new-dataset-state-legislative-elections-1971-2012/</u> Ballotpedia.org has more recent data: <u>https://ballotpedia.org/State_legislative_historical_elections_by_year</u> High turnover is an indicator of resident dissatisfaction with governance.

EPA Smart Location Mapping

https://www.epa.gov/smartgrowth/smart-location-mapping

This project provides insights into access to jobs via transit and a national walkability index.

2.1.8 Social capital

Decennial Census Response Rates

https://www.census.gov/data/datasets/2010/dec/2010-participation-rates.html (Martin and Newman 2014) find evidence that the mail-return rate predicts other measures of social capital

IRS SOI Migration

https://www.irs.gov/statistics/soi-tax-stats-migration-data-2015-2016

The smallest level of aggregation available from the IRS SOI is at the county level. HI DOTAX may be willing to provide a similar statistic for individuals that moved across census tract boundaries in Hawaii

2.1.9 Housing

HUD eGIS

https://egis-hud.opendata.arcgis.com/datasets/c1c32742599a42c9a45c95be50ed2ab6_0 Location Affordability Index v 2.0 includes

State of Hawaii Department of Human Services

http://humanservices.hawaii.gov/bessd/home/hp/ Point-in-time counts of homelessness:

UH Center on the Family

http://uhfamily.hawaii.edu/publications/list.aspx Homeless Service Utilization Reports:

Other measures

ACS overcrowding, homeownership, median gross rent

2.2 Suggestions for Existing Data Collection Efforts

For survey data, the sample selection defines which comparisons are possible and appropriate. The ACS collects systematic samples of households stratified by county, school district, and census designated place. The goal of the Census sampling strategy is to oversample sparsely populated regions to have a more accurate count of the population.

In general, the sampling requirements should be driven by the comparisons we wish to make. If the goal is to compare the aggregate well-being of areas covered by the ACS, the ACS sampling design should be sufficient. If the model of well-being requires different weights to be applied to different people (i.e., we care more about the experience of particular subpopulations), than oversampling the rarer group would be required.

2.3 Indirect and Inferential Measures

The following list of indirect and inferential measures can help paint a more nuanced picture of well-being in Hawaii. These measures should be viewed as complementary to the systematic, governmental statistical efforts. For many of these measures, the population affected is different than the general population of HI. It is important to keep this in mind to avoid policy decisions that ignore vulnerable populations because of a convenience sample. An obvious example is Yelp data, which is biased towards its users and their preferences.

Indeed employment listings

Indeed listings to find demand for employment (e.g.,

https://www.nytimes.com/interactive/2018/04/03/upshot/what-is-your-citys-twin.html). Greater employment demand represents an opportunity for workers, the type of employment is an indicator of job quality.

GoAkamai.org traffic data

GoAkamai.org is a cooperative program of the Hawai`i State Department of Transportation and the City & County of Honolulu Department of Transportation Services. It could be scraped to

build a dataset of traffic incidents and commute times to better understand access to work and leisure activities.

HIDOT Highways Program Status

HDOT Highways Program Status includes maps of current construction projects with estimated costs, which can be used to estimate public infrastructure investments affecting a given region/commuting route. This set of maps also includes data on fatal crashes. <u>https://histategis.maps.arcgis.com/apps/MapSeries/index.html?appid=39e4d804242740a89d3fd</u> <u>Obc76d8d7de</u>

Utility outage reports

Electric utility outages represent instability whether the source is Mother Nature or fundamental infrastructure issues. For C&C of Honolulu, HECO updates outage reports every 15 minutes. HELCO and MECO report outages via their twitter feeds. For the Kauai Island Utility Cooperative, outages are reported to their Facebook page.³⁷

HIDOH Injury Prevention and Control

http://histategis.maps.arcgis.com/apps/webappviewer/index.html?id=2ad9abc4cf064a9dabbf467 63eddf8b5

Oahu Motor Vehicle Crashes Map (2007-2016) - DOH Injury Prevention and Control Section:

Amenity maps

The City of Pasadena's QOL study created maps of open space gaps. These were constructed by creating a ¼ mile and ½ mile buffer surrounding public parks to identify areas that were not in "walkable" distance of a neighborhood or community park³⁸. To measure access to nutrition, they included a map of grocery stores, supermarkets, and convenience stores. ESRI Business Analyst provides direct access to much of this data at the desired levels of geographic aggregation³⁹. These sources along with Google Maps, and other mapping sources that include business listings would help to identify transportation resources, cultural resources (museums), restaurants, and grocery stores (access to affordable/healthy options).

Gun Violence Archive

http://www.gunviolencearchive.org/query

The Gun Violence Archive database search allows users to see address, geographic coordinates, and links to news sources for gun incidents in Hawaii:

 ³⁷ HECO: <u>https://www.hawaiianelectric.com/safety-and-outages/power-outages/outage-map;</u>
 HELCO: <u>https://twitter.com/hielectriclight;</u> MECO: <u>https://twitter.com/mauielectric;</u> Kauai Island Utility
 Coop: <u>https://www.facebook.com/KauaiCoop/</u>

https://ww5.cityofpasadena.net/public-health/wp-content/uploads/sites/51/2017/02/Quality-of-Life-2012-Fi nal-with-Links.pdf, page 52.

³⁹ <u>http://www.esri.com/software/businessanalyst</u>

Farmers markets

https://www.ams.usda.gov/local-food-directories/farmersmarkets

TheBus transit data

TheBus transit feed could be scraped to get a sense over time of ridership and time to work for primary commuting corridors. <u>https://transitfeeds.com/p/thebus-honolulu/57</u>

Other sources

Yelp, AirBNB, Zillow, Twitter (geocoded sentiment analysis), HPR Community Calendar (<u>http://hawaiipublicradio.org/community-calendar</u>), Meetup, and Eventbrite.

2.4 Opportunities for Improving Community-Level Comparisons

The biggest gap in comparing across communities is the relevance of community boundaries. Census tracts have the desirable feature of being relatively static across time. This consistency facilitates comparison across time to identify areas of growth and stagnation. A drawback of the relatively static boundaries is that these static boundaries may not reflect local notions of community or neighborhood, even if they did at one time. As a result, census tracts are unlikely to truly reflect current perspectives on community or neighborhood identity.

Several approaches to useful community boundaries are possible and depend on the purpose of the community comparison desired. For policy-making, legislative district boundaries are important. The US Census Bureau provides block assignment files (https://www.census.gov/geo/maps-data/data/baf_description.html), which facilitates the assignment of ACS data to legislative districts. Allowing users themselves to identify boundaries may be appropriate in certain contexts, but (Shelton et al. 2015) document the fluidity of self-reported boundaries using geotagged Twitter data in Louisville, KY. Given the intractability of identifying a best boundary for every case, using small areas that can be easily transformed to common use cases is ideal. A natural recommendation is the census tract as the primary level of disaggregation. Estimates for census tracts can be applied directly to fully-contained geographic units. For larger levels, census tracts can be aggregated using population/housing-unit weighting.

A better measure of economic means within a community than median income is to compare income at the household level to household-level income needs. The proportion of households with sufficient means is a measure of the level of economic well-being within a community. The Institute for Women's Policy Research and the National Council on Aging have developed the BEST⁴⁰ index to measure the income a working adult would need to meet their basic needs in

⁴⁰ The Basic Economic Security Tables (BEST) Index is available by sex, family size, and age range of children: <u>https://iwpr.org/publications/basic-economic-security-tables-us-methodology-supplemental-data/</u> <u>http://www.basiceconomicsecurity.org/BEST/definition.aspx</u>

select cities, counties, and states. Adjusting for family size is often done using an equivalence scale. Equivalence scales allow for economies of scale, some controlling for number of children.

ESRI's approach for simulating disaggregated data⁴² is to link consumer/household-level data in surveys like the Consumer Expenditure Survey to similar socioeconomic characteristics. A key problem with this approach is that we assume that the socioeconomic characteristics that overlap across the two geographic scales are sufficient for identifying the differences in the variable we are predicting. For example, suppose we have gender, race, and ages of household members, these details cannot be sufficient to have confidence over predictions of households not in the training set. We can use a test set to estimate the accuracy of our model out of sample. This can help provide more reasonable bounds on the accuracy of census-tract level estimates projected from higher levels of aggregation.

2.5 Tableau Visualizations

Each potential audience of the well-being index will have different data and visualization demands. Tableau is an accessible tool to quickly create functional visualizations that answer policy questions. Legislators could use reports on their district to identify community needs, opportunities, and successes. An effective visualization will highlight striking differences. Comparing a specific community to the state average (either directly or by listing a community-level ranking) will help to identify the indicators in which a given community is an outlier. Identifying the top 3 and bottom 3 indicators for a community would be an effective entryway into the full well-being analysis.

The world of information visualization has a useful mantra guiding the development of interactive systems, "overview first, zoom and filter, then details on demand" (<u>Shneiderman</u> <u>1996</u>). This taxonomy of tasks can be a valuable guide to presenting the complex information surrounding well-being and its comparison across Hawaii. Overview first, echoes the inverted pyramid in journalism, leading with a summary of the most important points.

Each interactive piece can follow this advice by leading with the most important takeaway. This can be done by making the most important piece the dominant visual "above-the-fold". Tableau facilitates the "zoom and filter" actions natively, but it's a good idea to have a visual component that demonstrates how users can zoom and filter. For "details on demand", it is important to provide easy access to the underlying data and documentation of any calculations performed.

⁴¹ Common examples of equivalence scales are the square root of household size.

⁴² <u>http://downloads.esri.com/esri_content_doc/dbl/us/J9945_2017_US_Consumer_Spending_Data.pdf</u>

3 Discussion

The indicators listed above should be viewed as a starting point. New (or previously overlooked) and useful datasets will demand inclusion in future version of a well-being index for Hawaii. Where possible, these new data sources can be included and prior year well-being levels be reestimated to allow comparison over time.

For the overall measure of well-being, we recommend the approach from the OECD Better Life Index that gives users the ability to create and share their own choice of weights on the well-being domains. For each domain, we recommend selection of an appropriate leading indicator.

To create a well-being index for Hawaii, it is necessary to (a) identify a core indicator for each domain, (b) identify supplementary indicators for each domain, (c) calculate composite indices for each domain, and (d) provide a mechanism for allowing users to create their own overall composite well-being index.

The goal should be to identify, for each domain, a single candidate indicator that can act as the primary key performance indicator (KPI). Within each domain, competitor indicators, complementary indicators, and indicators that are often used to explain/predict the primary indicator should also be presented. If no one indicator makes sense as a KPI, the domain is either poorly defined or too broad and should be broken up further.

The large pool of potential indicators can be ranked by the information they provide in cross-region comparisons. Principal component analysis and factor analysis more broadly would be used to identify the indicators with the most explanatory power in each domain.

The identified indicators can be combined to form domain-level indices. For each domain, a primary indicator can be selected as the basis for constructing the composite index. For example, to create a composite index for Economic Opportunity, regress census-tract level median income on the other indicators within the Economic Opportunity domain. The predicted levels of median income can then be ranked to produce the resulting index.

The following list provides our recommended primary indicators for each domain:

Economic Opportunity: Median income (ACS) [interim], HI DOTAX normalized headcount of families with income above the BEST Index [preferred]
Health: Self-reported health status (CDC's 500 Cities census-tract level estimate)
Community Security: Number of violent crimes per capita (HPD Crime Incidents⁴³)
Education: % with bachelor's degree
Institutions (Governance): Voter turnout
Social Capital: Decennial Census Response Rates
Housing: Rental burden

⁴³ <u>https://data.honolulu.gov/dataset/HPD-Crime-Incidents/f5dd-pqys</u>

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