HAZARD VULNERABILITY DATA EXPLORER

DATA EXPLORATION WIDGET FOR FLORIDA SOCIAL VULNERABILITY INDEX (SoVI), MEDICAL VULNERABILITY INDEX (MedVI), HAZARDS VULNERABILITY (HazVI) INDEX AND COMMUNITY RESILIENCE INDEX

2014 User's Guide

Planning Program
Bureau of Preparedness and Response
Division of Emergency Preparedness
and Community Support

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Overview

The Hazard Vulnerability Data Explorer (HVDE) is a Geographic Information System (GIS)-based widget and database that provides exploration, comparison and spatial query capabilities regarding social vulnerability, medical vulnerability, all-hazards vulnerability and community resilience indexes for Florida's cities, counties and specific geographic areas.

The widget allows:

- Search by attributes (e.g., identify the areas with high social vulnerability and high medical vulnerability).
- Search by graphics (e.g., identify the areas intersecting a polygon drawn by the user)
- Display maps.
- Display statistics for the selected features.
- Display and export selected features.

Getting to the Hazard Vulnerability Data Explorer

Getting to the Hazard Vulnerability Data Explorer (HVDE) widget is fairly simple. All you need is an internet connection into which you enter the following URL: http://gis.doh.state.fl.us/ESF8PlanningMap/. The widget is also available at http://129.252.37.169:8400/medviapp/index.html

After you click on the icon, you should see Hazard Vulnerability Data Explorer screen.

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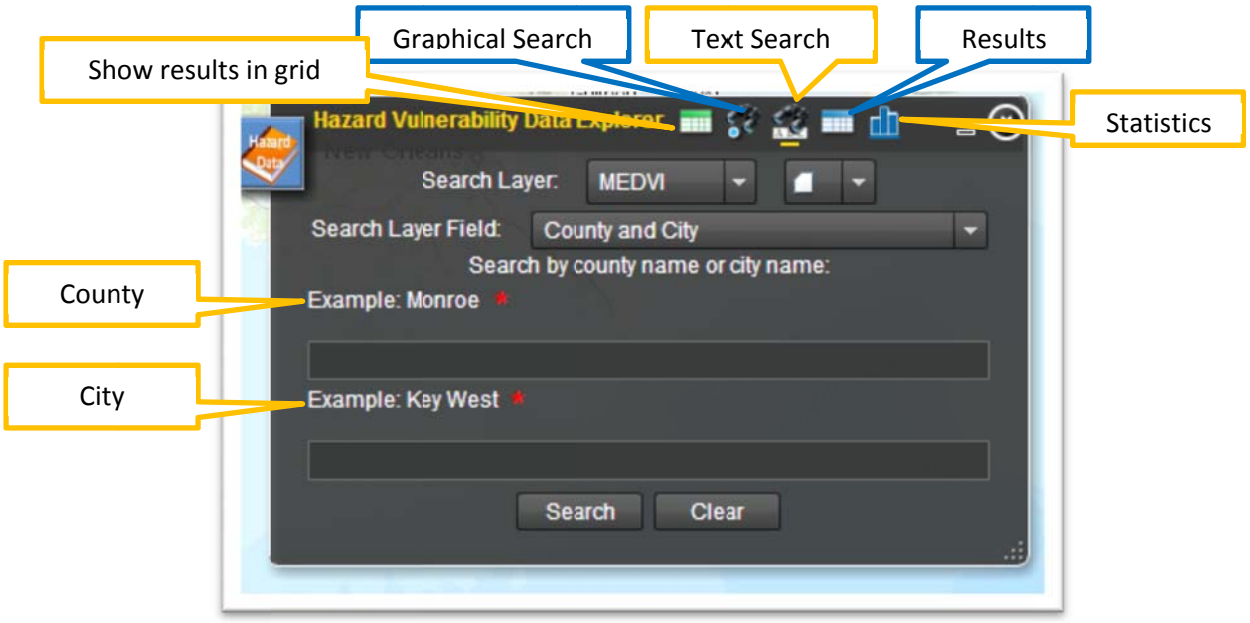

The widget automatically opens with the *Text Search* functionality enabled. This portion of the widget enables us to utilize the data (MedVI, SoVI, and HazVI) alone or in combination with specific hazard layers for exploration, planning, and reporting.

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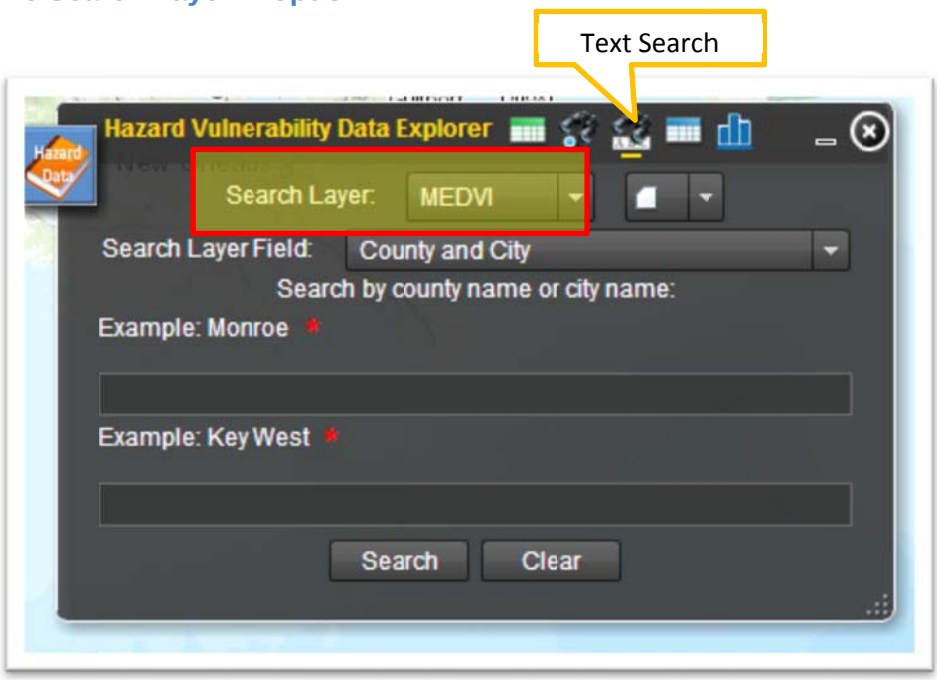
Using the Hazard Vulnerability Data Explorer Widget

The Text Search Button

The Search Layer Dropdown



The *Text Search* button opens the *Search Layer dropdown.* This first dropdown provides a place for you to select which individual or combined data set you are interested in gathering more detail about. Selections from this dropdown include the following:

1. MedVI – Loads only the Medical Vulnerability Index data for the entire state (census tract level).
2. SoVI – Loads only the Social Vulnerability Index data for the entire state (census tract level).
3. HazVI – Loads only the Hazard Vulnerability Index data for the entire state (census tract level).
4. FLPHRAT – Loads only the "Community Resilience" components for the entire state (county level).

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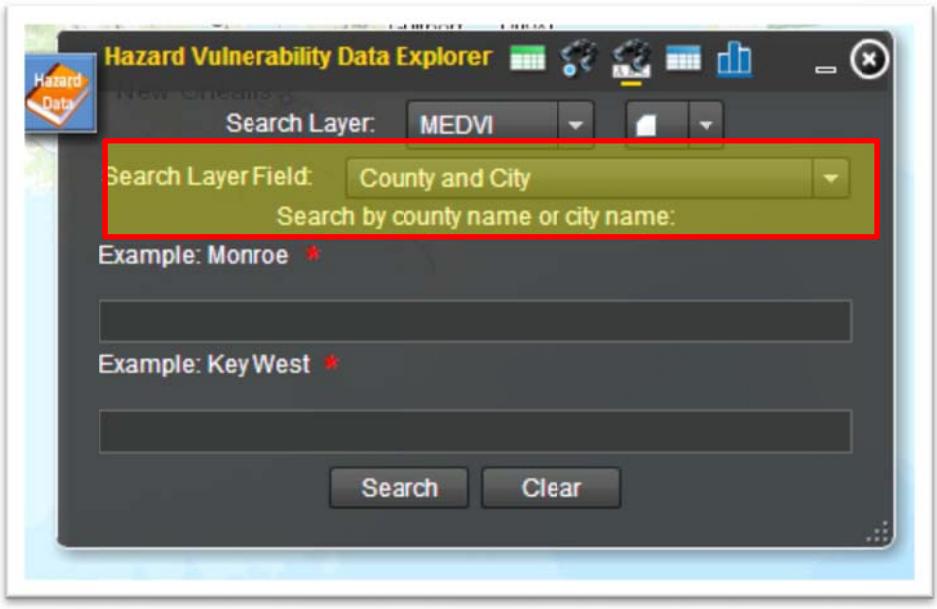
The Search Layer Field Dropdown

Here you can select a variety of different options enabling you to create datasets based on any of the different combinations of data present in the database. For instance, if you choose MedVI in the *Search Layer* dropdown and select *County and City* in the *Search Layer Field* dropdown, you enable the widget to provide MedVI data back to you based on specific county or city input in the *County* and *City* entry boxes.



Conversely, if you select MedVI from the *Search Layer* dropdown and SoVI from the *Search Layer Field* dropdown you will be returned MedVI information for only those places with high social vulnerability.

The available options in the Search Layer Field dropdown are quite expansive and each opens up a slightly different set of data. These are some of the options:

1. City and County – Selects data based on either a city or a county.
2. SoVI Category – Selects data based on SoVI standard deviation category (Low, Medium, High).
3. MedVI Category – Selects data based on MedVI standard deviation category (Low, Medium, High).
4. HazVI Category – Selects data based on HazVI standard deviation category (Low, Medium, High).
5. SoVI and MedVI Category – Selects data based on SoVI and MedVI standard deviation categories (Low, Medium, High).

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6. SoVI and HazVI Category – Selects data based on SoVI and HazVI standard deviation categories (Low, Medium, High).
7. MedVI and HazVI Category – Selects data based on MedVI and HazVI standard deviation categories (Low, Medium, High).
8. SoVI, MedVI, and HazVI Category – Selects data based on SoVI, MedVI, and HazVI standard deviation categories (Low, Medium, High).
9. MedVI, SoVI, and Flood 100 Zone – Selects data based on SoVI and MedVI standard deviation categories (Low, Medium, High) and intersection (coincidence) with the 100 Year Flood Zone.
10. MedVI, SoVI, and Flood 500 Zone – Selects data based on SoVI and MedVI standard deviation categories (Low, Medium, High) and intersection (coincidence) with the 500 Year Flood Zone.
11. MedVI, SoVI, and Quake Zone – Selects data based on SoVI and MedVI standard deviation categories (Low, Medium, High) and intersection (coincidence) with the Earthquake Hazard Zone.
12. MedVI, SoVI, and Hurricane Wind Zone – Selects data based on SoVI and MedVI standard deviation categories (Low, Medium, High) and intersection (coincidence) with the High Hurricane Wind Hazard Zone.
13. MedVI, SoVI, and Hurricane Surge Zone – Selects data based on SoVI and MedVI standard deviation categories (Low, Medium, High) and intersection (coincidence) with the Hurricane Surge Hazard Zone.
14. MedVI, SoVI, and Wildfire Zone – Selects data based on SoVI and MedVI standard deviation categories (Low, Medium, High) and intersection (coincidence) with the High Wildfire Hazard Zone.

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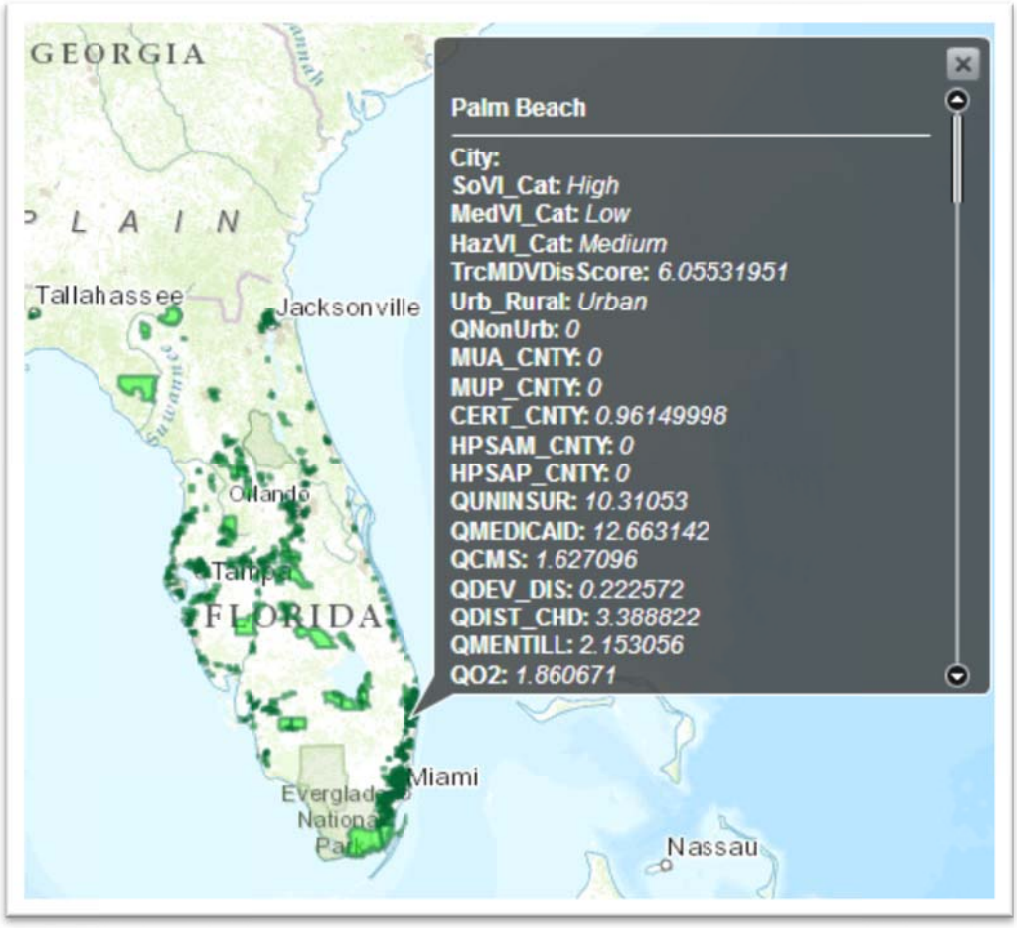
The Info Box



Once a selection is made, the *Info Box* pops up providing a point and click exploration of selected entities. In the case here, the mouse highlighted a census tract in Palm Beach County. The information in the *Info Box* will change if another entity in the map is selected.

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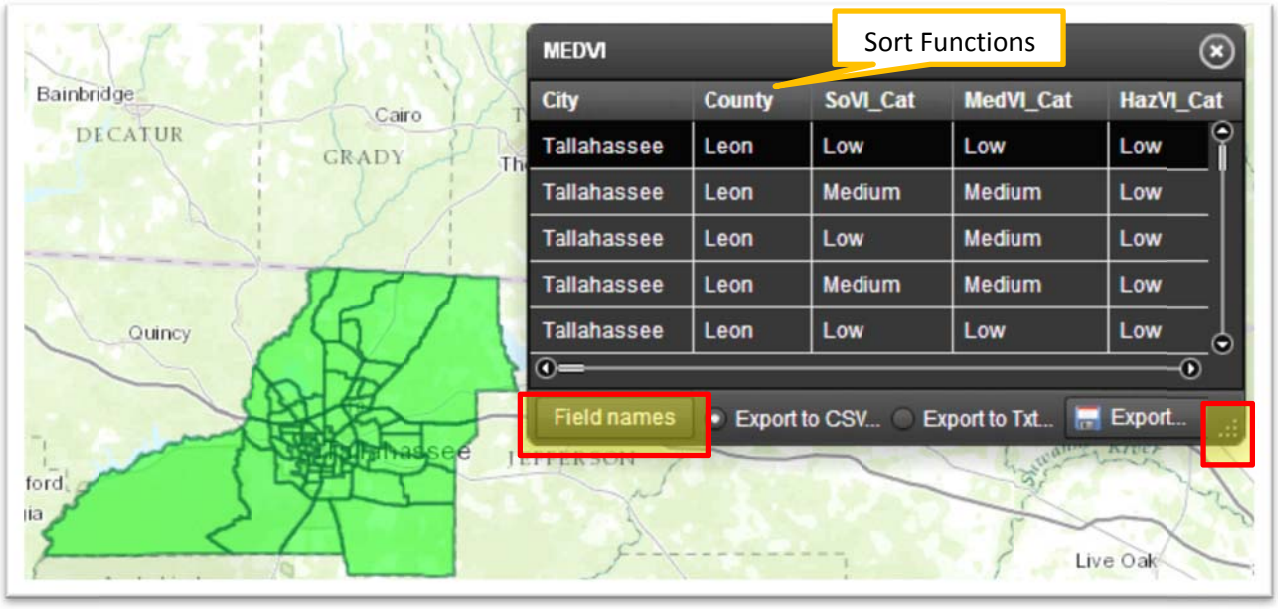
The Results Window



After a selection is made, the map will zoom to the selected features and a *Results Window* will pop up.

The *Results Window* displays some of the rows and columns, and it can be made larger or smaller by dragging the lower right corner out. The window can be moved around the screen per user preference. To learn more about field names that are not obvious, users can click on the *Field Name* button highlighted above. This will load a .pdf with a full description of each field name.

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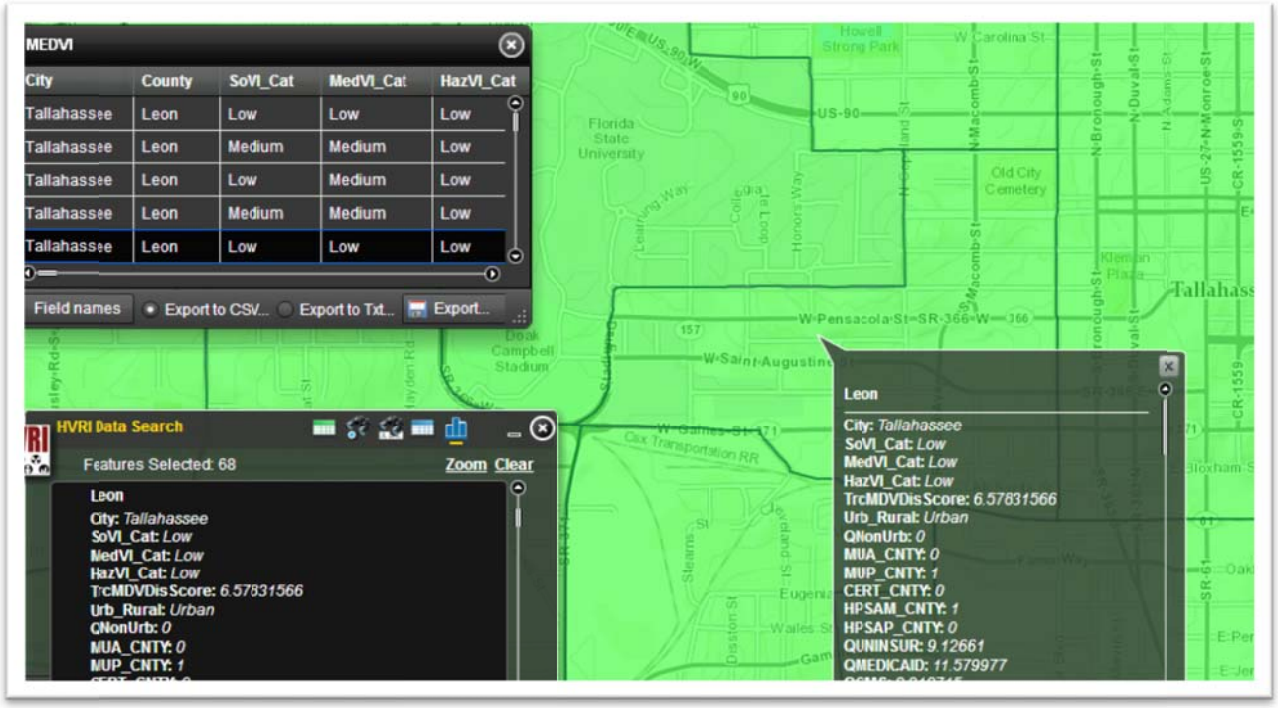
Downscaling the Results



Selecting individual rows from the Results Window will zoom the map to a specific entity and supply user with information about that entity.

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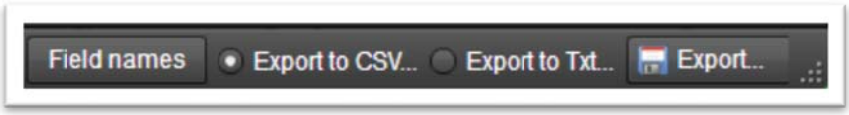
Result Window Tools

On the lower bar of the Results Window are additional buttons enabling user to export the data into a database friendly format for use in statistical, mapping, and charting software.



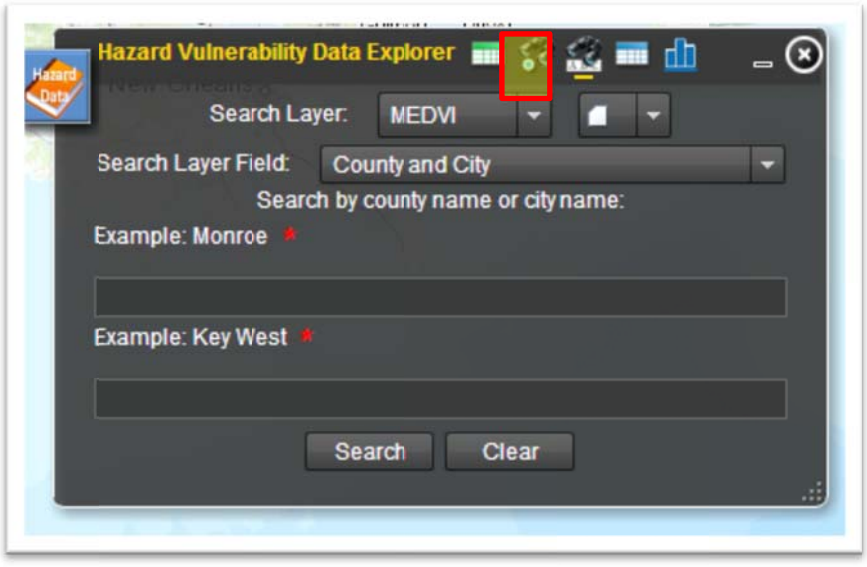
Understanding field names

Additionally, the bar includes a link to the data dictionary so that users can identify and learn about specific table attributes. Clicking this button will open up a .pdf version of the data dictionary.

Exporting data for use in other software

Two options for exporting the data for use in other software are available for the user, .csv (Excel), and .txt (SAS, SPSS, SQL server). This functionality may be limited in versions of Internet Explorer older than 10. **In the case that user is operating an older version of Internet Explorer, the ".csv" is not automatically added to the document and user must manually add the extension to the download when selecting a location to save.**

The Geographical Search Button



The button identified by binoculars and a "point" designates the *Geographical Search* button. This button is used to create ad hoc regions that do not fall into either a city or a county.

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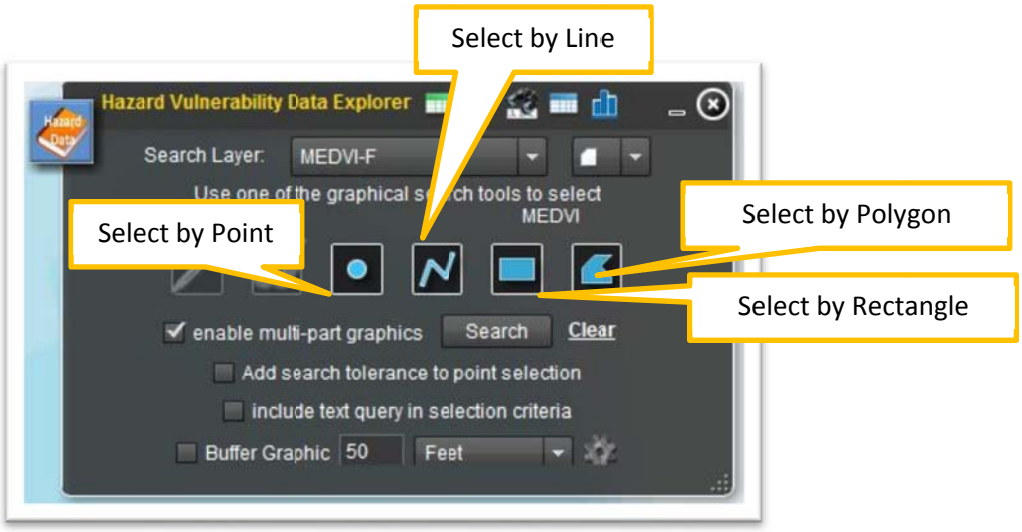
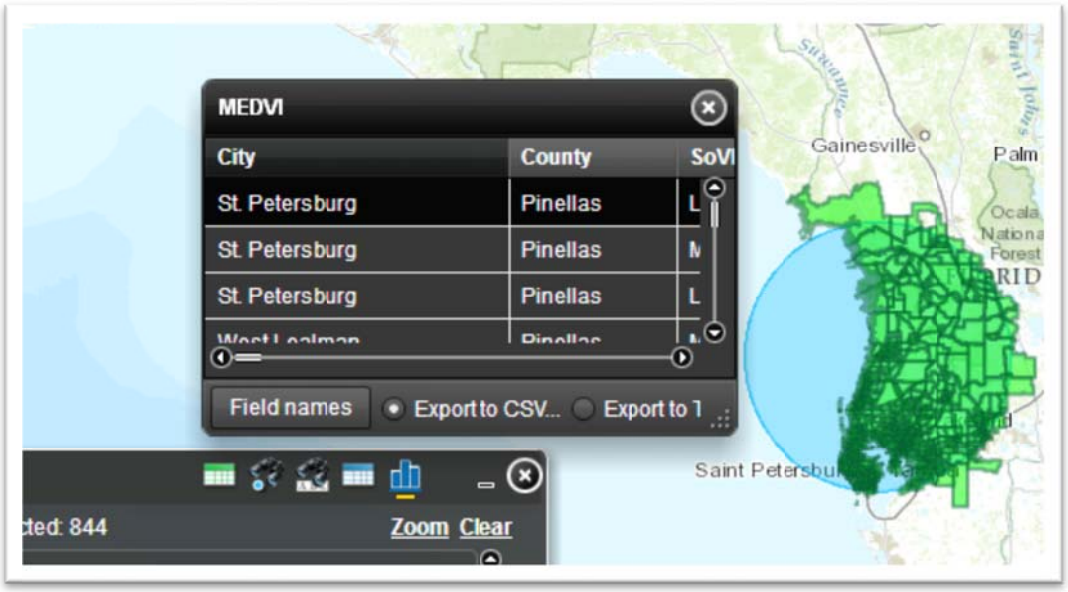


For example, a user could select the "point" below and the buffer graphic selection to make a 50 mile selection of the data. Then simply clicking the map to place the point (e.g. Crystal River Nuclear Plant) and clicking the *Search* button will return results for all entities within 50 miles – in this case 844 census tracts across greater central Florida.



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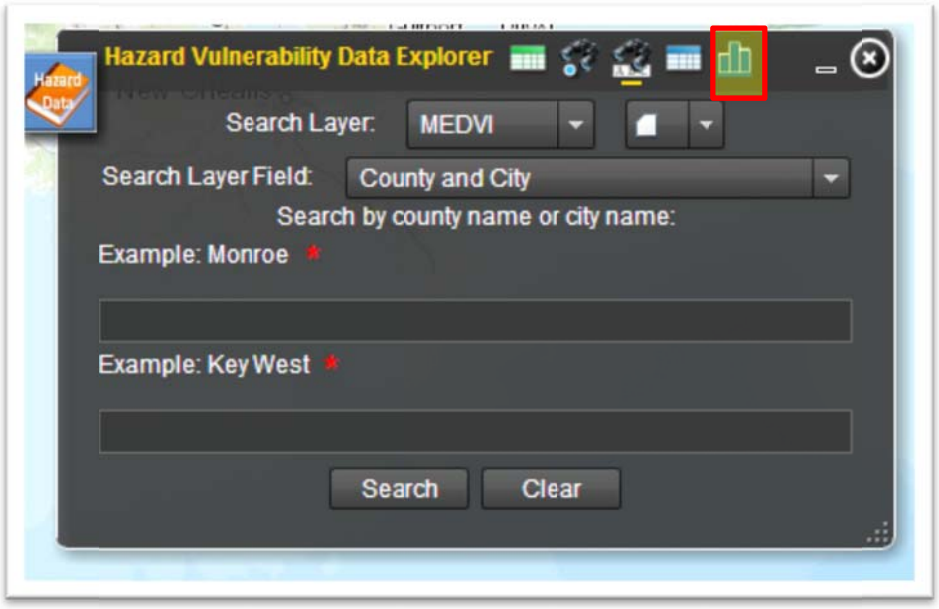
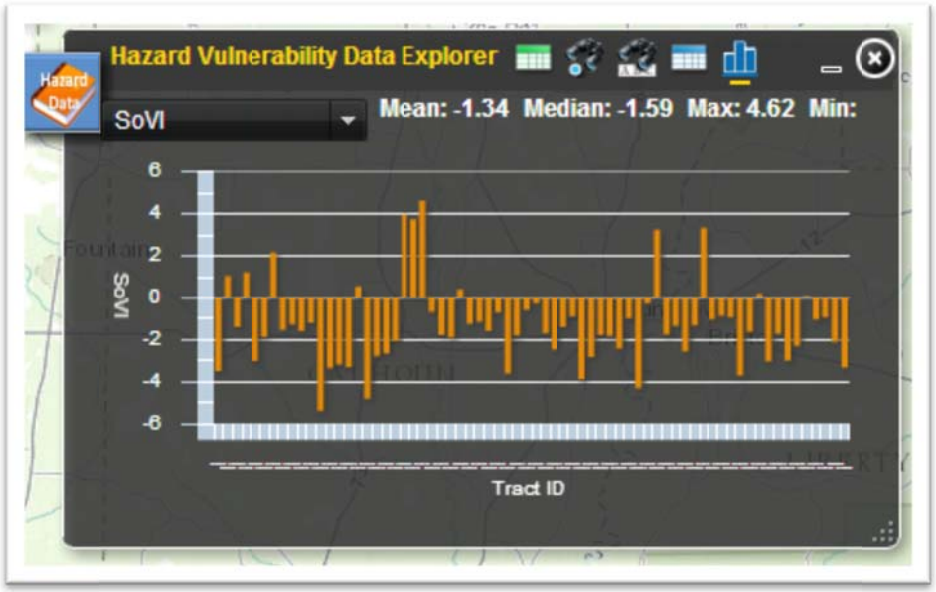
The Statistics Button



This button will open a statistics widget enabling you to see the histogram for your selection. The X Axis on the histogram always references the tracts within the selection. The Y axis of the histogram changes with user's selection of SoVI, HazVI, MedVI, or total population.



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Attachment A. Key Concepts

Social Vulnerability

Social Vulnerability identifies the pre-event conditions of the population that either exacerbate or attenuate impacts from hazards and disasters. For example, special needs populations have characteristics that increase their risk: this population is difficult to identify, invariably is left out of recovery efforts and is often invisible in communities. Age is also a social characteristic that affects risk and increases vulnerability: the elderly and children have limited mobility out of harm's way, and they need special care and are more susceptible to harm.

The Social Vulnerability Index (SoVI) is estimated using county level socioeconomic profiles based on decennial census. Some of the Social Vulnerability factors are: socioeconomic status, development density, age, race and gender (black and females), rural areas, race (Asian), economic dependence (debt/revenue), ethnicity (Hispanic), migration/growth, and gender employment (working women). The SoVI provides evidence of disparities in potential impacts and in the ability to recover from catastrophes.

Biophysical Vulnerability

Identifies places threatened by climate change related hazards.

Medical Vulnerability

Identifies those characteristics of a community (i.e. healthcare access) and individuals (i.e. chronic illness) that produce special needs populations.

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Attachment B. HVDE Data Dictionary

Field Name	Association	Description
County	FLPHRAT	County name
Drt_Prob	FLPHRAT	Annual probability of loss causing drought events based on historical frequency
Quk_Prob	FLPHRAT	Annual probability of earthquake event based on historical frequency
Fld_Prob	FLPHRAT	Annual probability of flood event based on NFIP risk determination
HailProb	FLPHRAT	Annual probability of loss causing hail events based on historical frequency
Hur_Prob	FLPHRAT	Annual probability of hurricane event based on historical frequency
Lgtn_Prob	FLPHRAT	Annual probability of loss causing lightning events based on historical frequency
Win_Prob	FLPHRAT	Annual probability of loss causing wind events based on historical frequency
SS_Prob	FLPHRAT	Annual probability of loss causing severe storm events based on historical frequency
Torn_Prob	FLPHRAT	Annual probability of loss causing tornado events based on historical frequency
WF_Prob	FLPHRAT	Annual probability of loss causing wildfire events based on historical frequency
Wnd_Prob	FLPHRAT	Annual probability of loss causing wind events based on historical frequency
SoVI06_10	FLPHRAT	Social vulnerability score (2006-2010) based on HVRI formulation
SoVI_Trn	FLPHRAT	SoVI score transformed to fit a 1 - 4 scale
SoVI_STD	FLPHRAT	Standard deviation classification of SoVI score (Low = <-.5 STD, Med = -.5 Std. - .5 Std., High = > .5 Std.)
SoVI_Cat	FLPHRAT	Categorical representation of SoVI_STD (Low, Medium, High)
ED_EQ	FLPHRAT	Ratio of the pct. Population with college education to the pct. Population with no high school diploma
QNONELDERL	FLPHRAT	Percent non-elderly population
QVEHICLE	FLPHRAT	Percent population with a vehicle
QPHONE	FLPHRAT	Percent population with a telephone
QNOESL	FLPHRAT	Percent population not speaking English as a second language
QNODISABLE	FLPHRAT	Percent population without a sensory, physical, or mental disability
HLTINSURE	FLPHRAT	Percent population with health insurance coverage
SCR_SOCIAL	FLPHRAT	Social resilience composite score
QHMOWNER	FLPHRAT	Percent homeownership
QEMPLOYED	FLPHRAT	Percent employed
GINI	FLPHRAT	GINI coefficient
QNONPRIMEM	FLPHRAT	Percent population not employed in farming, fishing, forestry, and extractive industries
QFEMLBR	FLPHRAT	Percent female labor force participation
BUSRAT	FLPHRAT	Ratio of large to small businesses
PHYSN	FLPHRAT	Number of physicians per 10,000 population
SCR_ECONOM	FLPHRAT	Economic resilience composite score
MITPLAN	FLPHRAT	Percent population covered by a recent hazard mitigation plan
NFIP	FLPHRAT	Percent housing units covered by NFIP policies
QMUNISERV	FLPHRAT	Percent municipal expenditures for fire, police, and EMA

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Field Name	Association	Description
CRS	FLPHRAT	Percent population participating in Community Rating System for Flood (CRS)
GOVTS	FLPHRAT	Number of governments and special districts
PDD	FLPHRAT	Number of paid disaster declarations
CITIZENCOR	FLPHRAT	Percent population covered by Citizen Corps programs
STORMREADY	FLPHRAT	Percent population in Storm Ready communities
SCR_INSTIT	FLPHRAT	Institutional resilience composite score
QNOMOHO	FLPHRAT	Percent housing units that are not mobile homes
RENTVAC	FLPHRAT	Percent vacant rental units
HOSPBED	FLPHRAT	Number of hospital beds per 10,000 population
RDYMILES	FLPHRAT	Principle arterial miles per square mile
QNOHS70_94	FLPHRAT	Percent housing units not built before 1970 and after 1994
HOTELMOTEL	FLPHRAT	Number of hotels/motels per square mile
SCHOOLS	FLPHRAT	Number of public schools per square mile
SCR_INFRAS	FLPHRAT	Infrastructure resilience composite score
LOINTLMIGR	FLPHRAT	Net international migration
STILL_LIVE	FLPHRAT	Percent population born in a state that still resides in that state
VOTE2004	FLPHRAT	Percent voter participation in the 2004 election
RELIGADHER	FLPHRAT	Number of religious adherents per 10,000 population
CIVIC	FLPHRAT	Number of civic organizations per 10,000 population
SOCADV	FLPHRAT	Number of social advocacy organizations per 10,000 population
CREATIVECL	FLPHRAT	Percent population employed in creative class occupations
SCR_COMMUN	FLPHRAT	Community capital resilience composite score
BRIC	FLPHRAT	Baseline resilience indicator score
BRIC_Trn	FLPHRAT	BRIC score transformed to fit a 1 - 4 scale
BRIC_STD	FLPHRAT	Standard deviation classification of BRIC score (Low = <-.5 STD, Med = -.5 Std. - .5 Std., High = > .5 Std.)
BRIC_Cat	FLPHRAT	Categorical representation of BRIC_STD (Low, Medium, High)
City	MedVI	City name
County	MedVI	County name
Urb_Rural	MedVI	Urban rural indicator
QNonUrb	MedVI	Percentage non-urban land area in tract
MUA_CNTY	MedVI	Medically Underserved Area Indicator (1 = Underserved County)
MUP_CNTY	MedVI	Medically Underserved Population (1= Underserved Population)
CERT_CNTY	MedVI	CERT score based on min/scaling and addition of Cert_Train, Cert_Ex, and Cert_Act at the County and Zip levels
HPSAM_CNTY	MedVI	Health Practitioner Shortage Area - Mental (1 = Shortage Area) in county
HPSAP_CNTY	MedVI	Health Practitioner Shortage Area - Primary (1 = Shortage Area) in county
QUNINSUR	MedVI	% of the population under age 65 that is uninsured in county
QMEDICAID	MedVI	% of the population enrolled in Medicaid in county
QCMS	MedVI	% of children that are Children's Medical Services clients in county

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Field Name	Association	Description
QDEV_DIS	MedVI	% of the population that is developmentally disabled in county
QDIST_CHD	MedVI	% of children that are seriously emotionally disturbed in county
QMENTILL	MedVI	% of adults that with a serious mental illness in county
QO2	MedVI	% of the population that is oxygen dependents in county
QALZHEIM	MedVI	% of the population aged 65 and over with probable Alzheimer's diseases in county
QDIALYS	MedVI	% of the population that are dialysis clients in county
QELDERA	MedVI	% of the population aged 65 and over that live alone in county
QLOWHLTH	MedVI	% of adults who reported their overall health as "fair" or "poor" in county
QDIAB	MedVI	% of adults with diagnosed diabetes in county
QASTHMA	MedVI	% of adults that currently have asthma in county
QHEART	MedVI	% of adults that have ever had a heart attack, angina, or coronary heart disease in county
QHYPERTENS	MedVI	% of adults with diagnosed hypertension in county
QARTH	MedVI	% of adults who are limited in any way in any usual activities because of arthritis or chronic joint symptoms in county
QLBW	MedVI	% of babies born with low birth weight in county
VCRIMEPC	MedVI	Violent crime offenses per capita in county
DVIOL_PC	MedVI	Domestic violence offenses per capita in county
ZAccess	MedVI	Standardized community healthcare access score (Z-score) in county
ZQuality	MedVI	Standardized community healthcare quality score (Z-score) in county
NHBED	MedVI	Number of nursing home beds in county in county
NHB_PC	MedVI	Nursing home beds per capita in county
ALF_BEDS	MedVI	Number of assisted living, adult family care, and special service home facility beds in county in county
ALF_BPC	MedVI	Assisted living, adult family care, and special service home facility beds per capita in county
CNT_HOSPCE	MedVI	Number of hospice facilities in county
HSPCE_PC	MedVI	Hospice facilities per capita in county
HHA_Count	MedVI	Number of home health agency in county
HHA_PC	MedVI	Home health agency facilities per capita in county
HCS_count	MedVI	Number of homemaker and companion service facilities in county
HCS_PC	MedVI	Homemaker and companion service facilities per capita in county
c3PC	MedVI	Net funds for all 501(c)3 "other" health care organizations per capita in county
MUA_TR	MedVI	Medically underserved area (0 or 1) in tract
MUP_TR	MedVI	Medically underserved population (0 or 1) in tract
HPSAM_TR	MedVI	Health Practitioner Shortage Area - Mental (0 or 1) in tract
HPSAP_TR	MedVI	Health Practitioner Shortage Area - Primary (0 or 1) in tract
HBNEATRCnt	MedVI	Count of Hill Burton Facilities within 30 minute drive time in tract
HB_Rat	MedVI	Ratio of count of Hill Burton Facilities within 30 minute drive time and poverty population in tract
FQHCNEATrC	MedVI	Count of Federally Qualified Health Centers within 30 minute drive time of tract centroid in tract
FQHC_Rat_1	MedVI	Ratio of Federally Qualified Health Centers within 30 minute drive time to poverty population in tract
RHCNEATrCt	MedVI	Count of Rural Health Centers within 30 minute drive time of tract centroid in tract

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Field Name	Association	Description
RHC_Rat	MedVI	Ratio of count of Rural Health Centers within 30 minute drive time of tract centroid and total population in tract
EMTNEATrCt	MedVI	Count of Emergency Medical Response Units within 30 minute drive time of tract centroid in tract
EMTRATrCt	MedVI	EMT - Urban access - Count of number of EMT locations within 8:59 minute drive time of tract centroid in tract
EMTUATrCt	MedVI	EMT - Rural access - Count of number of EMT locations within 15 minute drive time of tract centroid in tract
EMT_Rat	MedVI	Ratio of EMT counts based urban or rural tract class to total population in tract
FACNEATrCt	MedVI	Count of Free Health Care Clinics within 30 minute drive time of tract centroid in tract
FAC_RAT	MedVI	Ratio of count of Free Health Care Clinics within 30 minute drive time of tract centroid to poverty population in 2010 in tract
CHCNEATrCt	MedVI	Count of County Health Clinics within 30 minute drive time of tract centroid in tract
CHC_Rat	MedVI	Ratio of count of County Health Clinics within 30 minute drive time of tract centroid to total population in 2010 in tract
CrdNEATrCt	MedVI	Count of hospitals specializing in emergency cardiac services within 30 minutes of tract centroid - Non Emergent Access in tract
CardUATrCt	MedVI	Count of hospitals specializing in emergency cardiac services within 8:59 minutes of tract centroid - Urban Access in tract
CardRATrCt	MedVI	Count of hospitals specializing in emergency cardiac services within 15 minutes of tract centroid - Rural Access in tract
Card_Rat	MedVI	Ratio of count of hospitals specializing in emergency cardiac services within 8:59 or 15 minutes of tract centroid to total population in tract
HosNEATrCt	MedVI	Count of all hospitals within 30 minutes of tract centroid - Non Emergent Access in tract
HospUATrCt	MedVI	Count of all hospitals within 8:59 minutes of tract centroid - Urban Access in tract
HospRATrCt	MedVI	Count of all hospitals within 15 minutes of tract centroid - Rural Access in tract
Hosp_Rat	MedVI	Ratio of Count of all hospitals within 30 minutes of tract centroid to total population in tract
CBAFem_To	MedVI	2010 number of females of child bearing age 10-49 in tract
MatNEATrCt	MedVI	Count of hospitals specializing in maternal cardiac services within 30 minutes of tract centroid - Non Emergent Access in tract
MatUATrCt	MedVI	Count of hospitals specializing in maternal cardiac services within 8:59 minutes of tract centroid - Urban Access in tract
MatRATrCt	MedVI	Count of hospitals specializing in maternal cardiac services within 15 minutes of tract centroid - Rural Access in tract
Mat_Rat	MedVI	Ratio of Count of hospitals specializing in maternal cardiac services within 8:59 or 15 minutes of tract centroid to female population of child bearing age in tract
MenNEATrCt	MedVI	Count of hospitals specializing in maternal cardiac services within 30 minutes of tract centroid - Non Emergent Access in tract
MenUATrCt	MedVI	Count of hospitals specializing in maternal cardiac services within 8:59 minutes of tract centroid - Urban Access in tract
MenRATrCt	MedVI	Count of hospitals specializing in maternal cardiac services within 15 minutes of tract centroid - Rural Access in tract
Men_Rat	MedVI	Ratio of Count of hospitals specializing in mental health services within or 15 minutes of tract centroid to total population in tract
StrkUATrCt	MedVI	Count of hospitals specializing in emergency stroke services within 8:59 minutes of tract centroid - Urban Access in tract
StrkRATrCt	MedVI	Count of hospitals specializing in emergency stroke services within 15 minutes of tract centroid - Rural Access in tract
Strk_Rat	MedVI	Ratio of Count of hospitals specializing in emergency stroke services within 8:59 or 15 minutes of tract centroid to total population in tract
Kid_Tot	MedVI	2010 number of children under age 18 in tract
PedNEATrCt	MedVI	Count of hospitals specializing in emergency pediatric services within 30 minutes of tract centroid - Non Emergent Access in tract

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Field Name	Association	Description
PEDUATrCt	MedVI	Count of hospitals specializing in emergency pediatric services within 8:59 minutes of tract centroid - Urban Access in tract
PedRATrCt	MedVI	Count of hospitals specializing in emergency pediatric services within 15 minutes of tract centroid - Rural Access in tract
Peds_Rat	MedVI	Ratio of Count of hospitals specializing in emergency pediatric services within 8:59 or 15 minutes of tract centroid to population under age 18 in tract
T12NEATrCt	MedVI	Count of hospitals specializing in trauma level 1 or level 2 services within 30 minutes of tract centroid - Non Emergent Access in tract
TL12UATrCt	MedVI	Count of hospitals specializing in trauma level 1 or level 2 services within 8:59 minutes of tract centroid - Urban Access in tract
TL12RATrCt	MedVI	Count of hospitals specializing in trauma level 1 or level 2 services within 15 minutes of tract centroid - Rural Access in tract
TL12_Rat	MedVI	Ratio of Count of hospitals specializing in trauma level 1 or level 2 services within 8:59 or 15 minutes of tract centroid to total population in tract
BrnNEATrCt	MedVI	Count of hospitals specializing in burn services within 30 minutes of tract centroid - Non Emergency Access in tract
BurnUATrCt	MedVI	Count of hospitals specializing in burn services within 8:59 minutes of tract centroid - Urban Access in tract
BurnRaTrCt	MedVI	Count of hospitals specializing in burn services within 15 minutes of tract centroid - Rural Access in tract
Burn_Rat	MedVI	Ratio of Count of hospitals specializing in burn services within 8:59 or 15 minutes of tract centroid to total population in tract
MEAN_AVCOMPOP	MedVI	Per Capita average number of water borne communicable diseases 2009-2011 in zip code
MEAN_MeanComZip	MedVI	Four year average of communicable diseases from 2008-2011 in zip code
MEAN_CERTTr_Zip	MedVI	Total number of CERT trained team members covering area in zip code
MEAN_CERTEx_Zip	MedVI	Number of CERT exercises undertaken covering area in zip code
MEAN_CERTActZIP	MedVI	Number of CERT activations covering area in zip code
MEAN_CERT_ZIP	MedVI	CERT score based on min/scaling and addition of Cert_Train, Cert_Ex, and Cert_Act at the County and Zip levels in zip code
MAX_HPSAM_ZIP	MedVI	Health Practitioner Shortage Area - Mental (0 - 1)in zip code
MEAN_EMNEAZIP	MedVI	Number of emergency medical practitioners within 30 minute drive time of zip codeine zip code
MEAN_EMRatNEA	MedVI	Ratio of number of emergency medicine physicians within 30 minute drive time to total population in zip code
MEAN_GERNEA_ZIP	MedVI	Number of geriatric practitioners within 30 minute drive time of zip codeine zip code
MEAN_GerRatNEA	MedVI	Ratio of number of geriatric physicians within 30 minute drive time to population over age 65 in zip code
MEAN_OBNEA_ZIP	MedVI	Number of obstetric practitioners within 30 minute drive time of zip codeine zip code
MEAN_OBRatNEA	MedVI	Ratio of number of obstetricians within 30 minute drive time to number of females in child bearing age (10-49)in zip code
MEAN_PedNEAZIP	MedVI	Number of pediatric practitioners within 30 minute drive time of zip codeine zip code
MEAN_PedRatNEA	MedVI	Ratio of number of pediatricians within 30 minute drive time to number of children under age 18 in zip code
MEAN_PrimNEAZIP	MedVI	Number of primary care practitioners within 30 minute drive time of zip codeine zip code
MEAN_PrimRatNEA	MedVI	Ratio of primary care physicians within 30 minute drive time to total population in zip code
MEAN_QDISAB	MedVI	% of the population that are OASDI Disability recipients in zip code
MEAN_QBRNSP	MedVI	% of the population with and brain or spinal cord injury in zip code
MEAN_QPREG	MedVI	% of women aged 10-49 that are WIC enrolled pregnant mothers in zip code
MEAN_QCMS	MedVI	% of children that are Children's Medical Services clients in zip code
MEAN_QDIALYS	MedVI	% of the population that are dialysis clients in zip code
TrcMDVDisScore	MedVI	Medical Vulnerability Score in zip code

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Field Name	Association	Description
MedVITrSTD	MedVI	Standard deviation classification of Medical vulnerability score (Low = <-.5 STD, Med = -.5 Std. - .5 Std., High = > .5 Std.)in zip code
SoVI_Cat	MedVI	Categorical representation of SoVI_STD (Low, Medium, High)in zip code
MedVI_Cat	MedVI	Categorical representation of MedVITrSTD (Low, Medium, High)in zip code
HazVI_Cat	MedVI	Categorical representation of HazVI_STD (Low, Medium, High)in zip code
City	SoVI	City name
County	SoVI	County name
P0010001	SoVI	Total Population in 2010 in tract
H00010001	SoVI	Total Housing Units in 2010 in tract
MEDAGE	SoVI	Median Age 2010 in tract
QBLACK	SoVI	Percent of population who are African American 2010 in tract
QNATAM	SoVI	Percent of population who are Native American 2010 in tract
QASIAN	SoVI	Percent of population who are Asian or Hawaiian Islanders 2010 in tract
QHISP	SoVI	Percent of population who are Hispanic 2010 in tract
QAGEDEP	SoVI	Percent of population either under 5 years of age 65 or over 2010 (i.e., elderly and young children as a percent of the total population) in tract
PPUNIT	SoVI	Average number of people per occupied household 2010 in tract
QRENTER	SoVI	Percent of housing units that are renter occupied 2010 in tract
QNHRRES	SoVI	Percent of population who are 65 and over in nursing facilities 2010 in tract
QFEMALE	SoVI	Percent of the population who are female 2010 in tract
QFHH	SoVI	Percent of households that are female headed, with no spouse present 2010 in tract
PERCAP	SoVI	Per capita income (in dollars) 2006-2010 in tract
QESL	SoVI	Percent of persons 18 and older speaking English as a second language with limited English proficiency (i.e., those who speak English not very well or not at all) 2006-10 in tract
QCVLUN	SoVI	Percent of population of workforce age (16-64 years) who did not work the in past 12 months 2006-10 in tract
QPOVTY	SoVI	Percent of the civilian non-institutionalized population living below poverty level 2006-10 in tract
QMOHO	SoVI	Percent of housing units that are mobile homes 2006-10 in tract
QED12LES	SoVI	Percent of the population 25 years or older with no high school diploma 2006-10 in tract
QFEMLBR	SoVI	Percent of the total civilian employed population 16 and older who are female 2006-10 in tract
QEXTRCT	SoVI	Percent of the civilian employed population 16 and older employed in farming, fishing, mining, and forestry occupations 2006-10 in tract
QSERV	SoVI	Percent of the civilian employed population 16 and older employed in service occupations 2006-10 in tract
QNOAUTO	SoVI	Percent of occupied housing units with no automobile in tract
QFAM	SoVI	Percent of own children under 18 living in married couple families in tract
QRICH200K	SoVI	Percent of households earning $200,000 or more 2006-10 in tract
QSSBEN	SoVI	Percent of households collecting social security benefits 2006-10 in tract
QURBAN	SoVI	Percent of the population living in urban block groups in tract
POPDENS	SoVI	Number of people per square mile land area 2006-10 in tract
MDGRENT	SoVI	Median gross rent (in dollars) for renter occupied housing units paying cash rent 2006-10 in tract
MDHSEVAL	SoVI	Median value (in dollars) of owner occupied housing units 2006-10 in tract
COMP1	SoVI	SoVI component 1 score

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Field Name	Association	Description
COMP2	SoVI	SoVI component 2 score
COMP3	SoVI	SoVI component 3 score
COMP4	SoVI	SoVI component 4 score
COMP5	SoVI	SoVI component 5 score
COMP6	SoVI	SoVI component 6 score
SoVI	SoVI	SoVI Score
SoVI_STD	SoVI	Standard deviation classification of Social Vulnerability Score(Low = <-.5 STD, Med = -.5 Std. - .5 Std., High = > .5 Std.)
SoVI_Cat	SoVI	Categorical representation of SoVI_STD (Low, Medium, High)
MedVI_Cat	SoVI	Categorical representation of MedVITrSTD (Low, Medium, High)
HazVI_Cat	SoVI	Categorical representation of HazVI_STD (Low, Medium, High)
City	HazVI	City name
County	HazVI	County name
MAX_CT_SHELDUS_Wind	HazVI	Count of loss-causing wind events between 1960 and 2010 at the county level
MAX_CT_SHELDUS_Tornado	HazVI	Count of loss-causing tornado events between 1960 and 2010 at the county level
MAX_CT_SHELDUS_Severe_Storm	HazVI	Count of loss-causing severe storm events between 1960 and 2010 at the county level
MAX_CT_SHELDUS_Lightning	HazVI	Count of loss-causing lightning events between 1960 and 2010 at the county level
MAX_CT_SHELDUS_Hail	HazVI	Count of loss-causing hail events between 1960 and 2010 at the county level
MAX_CT_SHELDUS_Coastal	HazVI	Count of loss-causing coastal events between 1960 and 2010 at the county level
MAX_CT_SHELDUS_Winter	HazVI	Count of loss-causing winter events between 1960 and 2010 at the county level
MAX_CT_SHELDUS_Heat	HazVI	Count of loss-causing heat events between 1960 and 2010 at the county level
MAX_CT_SHELDUS_Fog	HazVI	Count of loss-causing fog events between 1960 and 2010 at the county level
MAX_CT_Earthquake_Buffs	HazVI	Count of historical earthquake events
MAX_CT_HurrTrks_Buff	HazVI	Count of historical hurricane events within 50 miles
MAX_Drght_Freq	HazVI	Count of loss-causing drought events between 1960 and 2010 at the county level
MAX_Freq_Surge	HazVI	Probability of hurricane surge event occurrence
MAX_WFire_P	HazVI	Probability of a wildfire calculated using 30m grid cells and the likelihood of the area burning if ignited at the tract level
MAX_Freq_100	HazVI	Probability of 100 year flood event occurrence
MAX_Freq_500	HazVI	Probability of 500 year flood event occurrence
HazVITrScr	HazVI	Hazard Vulnerability score
HazVItrSTD	HazVI	Standard deviation classification of Hazard Vulnerability (Low = <-.5 STD, Med = -.5 Std. - .5 Std., High = > .5 Std.)
SoVI_Cat	HazVI	Categorical representation of SoVI_STD (Low, Medium, High)
MedVI_Cat	HazVI	Categorical representation of MedVITrSTD (Low, Medium, High)
HazVI_Cat	HazVI	Categorical representation of HazVI_STD (Low, Medium, High)

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Attachment C. HVDE Technical Information

Medical Vulnerability, Social Vulnerability and All-Hazards Vulnerability Technical Information

There is an uneven distribution of risks and hazards across the landscape. Some places (e.g. coastal areas, or inland areas along rivers) have more exposure to hazards than others do by virtue of their natural setting and the natural processes. Equally significant is the distribution of human settlements that also are not evenly spaced across the landscape. It is the interaction between the natural risks and hazards on the one hand, and settlements and the people who live in them on the other, that produces the "hazards of place," and helps to explain why some places and some population groups are more vulnerable to hazards, such as those occurring in Florida.

The Hazard Vulnerability Data Explorer (HVDE) provides a series of maps and analytics depicting the existing social vulnerability, all hazard (bio-physical) vulnerability and medical vulnerability within the state of Florida. The HVDE provides a scientifically based mechanism to assist the Florida Department of Health personnel in assessments of programmatic needs and opportunities within the state. It provides the foundation for developing targeted strategic initiatives for disaster risk reduction including preparedness for response and recovery, and longer-term adaptation in those most vulnerable and highly impacted areas. The HVDE provides a new approach to regional assessments of potential hazard impacts by presenting a geographically referenced assessment of social, hazard, and medical vulnerability.

Social Vulnerability

The concept of vulnerability, or the potential for harm is a means for understanding the interactions between social and ecological systems. It also provides understanding on how such interactions give rise to hazards and disasters. Vulnerability explains the differential impacts of shocks or stressors to natural systems and the ability of those systems to absorb and withstand impacts (biophysical vulnerability). Social vulnerability, provides the societal context within which such stressors operate and highlights the uneven capacity for preparedness, response, recovery, and adaptation to environmental threats in social systems. To fully understand and characterize the hazards of places, it is required to create measures of the physical characteristics of hazards and the environment (hazard exposure) as well as those social, economic, demographic characteristics that influence a community's ability to prepare for, respond to, cope with, recover from, and ultimately adapt to environmental hazards (social vulnerability). Vulnerability is widely used to describe the differential impacts of environmental threats on people and the places where they live and work.

The Social Vulnerability Index (SoVI) is a quantitative measure of social vulnerability to environmental hazards. It provides a comparative metric that facilitates the geographic

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examination of differences in levels of social vulnerability across regions. SoVI includes those population characteristics known to influence the ability of social groups and communities to prepare for, respond to, and recover from disasters, especially coastal disasters. The index synthesizes socioeconomic variables into multiple dimensions, and sums the values to produce the overall score for the particular spatial unit (e.g. county, census tract) of interest. Conceptually, SoVI relates well to indices of social well-being, but its focus is on environmental hazards and the capacity of social groups to prepare for, respond to, and recover from disasters. For example, socioeconomic status (wealth or poverty) affects the ability of a community to absorb losses. Wealth enables communities to withstand the impact of losses more readily than those communities in poverty because of their access to capital, insurance and so forth.

Variables used in the SoVI computation were from the US Census Decennial product (2010) and US Census rolling 5-year American Community Survey (ACS) product (2006-2010.

Known Correlates of Social Vulnerability and Variables used to compute Florida SoVI

Race & ethnicity (% African American, % Native American, % Asian or Pacific Islander, % Hispanic): Impose language and cultural barriers for disaster preparedness and response; affects access to pre and post-disaster resources; minority group tendency to occupy high hazard areas; Non-white and non-Anglo populations are viewed as more vulnerable.

Socioeconomic Status (Per capita income, % households earning more than $200,000, % poverty): Affects community ability to absorb losses; wealth enables communities to recover more quickly using insurance, personal resources; poverty makes communities less able to respond and recover quickly.

Gender (% females in labor force, % female population, % female headed household, no spouse present): Women often have a more difficult time coping after disasters than men due to employment sector (personal services), lower wages, and family care responsibilities.

Age (Age depended populations:-% population under 5 years old and % population over 65, Median age, Rural/Urban, % urban population, Population density): Age extremes (elderly and very young) increase vulnerability; parents must care for children when day care facilities are not available; elderly may have mobility or health problems due to lower wealth and dependence on locally-based resource economy (farming); high density urban areas complicate evacuations and sheltering.

Renters (% renters, Median Gross Rent): Renters are viewed as transient populations with limited ties to the community; they often lack shelter options when lodging becomes uninhabitable after disasters or too costly; lack insurance, and often lack savings.

Residential property (Median value of owner occupied housing, % housing units that are mobile homes): The value, quality, and density of residential construction affect disaster losses and recovery; expensive coastal homes are costly to replace; mobile homes are easily damaged.

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Occupation (% employed in farming, fishing, forestry, % employed in service occupations): Some occupations especially those involving resource extraction (fishing, farming) can be affected by disasters; service sector jobs suffer as disposable income declines; infrastructure employment (transportation, communications, utilities) is subject to temporary disruptions post-disaster.

Family Structure (Average number of people per household, % families): Families with large numbers of dependents or single parent households may be more vulnerable because of the need to rely on paid care-givers.

Employment (% civilian labor force unemployed): Communities with high numbers of unemployed workers (pre disaster) are viewed as more vulnerable, because jobs are already difficult to obtain; this slows the recovery post disaster.

Education (% population over 25 with no high school diploma): Limited educational levels influence ability to understanding warning information, likely disaster impacts; access to post recovery resources.

Population Growth (% ESL :poorly or not at all): New immigrant populations lack language skills and are unfamiliar with state and federal bureaucracies in how to obtain disaster relief; may not be permanent or legal residents; unfamiliar with range of hazards in area.

Social Dependency and Special Needs Populations (% collecting social security benefits, Per capita residents in nursing homes, % no automobile): Residents totally dependent on social services for survival are often economically marginalized and thus more vulnerable; special needs populations (infirmed) require more time for evacuation and recovery is often difficult.

The variables were standardized and input into a Principal Components Analysis (PCA) to reduce the number of variables into a smaller set of multi-dimensional attributes or components. Positive values were associated with increasing vulnerability, and negative values associated with decreasing vulnerability. If a factor included negative and positive values that both influenced vulnerability (such as the elderly and the young), then the absolute value was used. Once the directionality was established, the components were added together to produce the final SoVI score.

Methodology

The steps taken in the construction of the Social Vulnerability Index for the Florida Department of Health at the tract level for Florida are listed below.

Sources of Data

Data used in the construction of SoVI for the State of Florida are collected from several sources as per the data type and information needed to complete each task.

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Preprocessing of Raw Data

U.S. census tract boundary and water boundary shapefiles were imported into ArcMap v10 for preprocessing. For this version of SoVI, The geographic study area was the state of Florida.

Calculation of SoVI Variables

Raw demographic data at the U.S. tract level were obtained using the 2010 American Fact Finder Website and related documentations, and from the American Community Survey (2006-2010).

The tabular data were imported into Microsoft Excel for processing. Each SoVI variable was calculated manually using the Excel's formula builder.

Principal Component Analysis

The Excel table containing calculated SoVI variables was first imported into ArcMap then spatially joined with the South Atlantic Division Census Tracts. Descriptive statistics were calculated for the entire dataset to verify the robustness of previous calculations. Data were standardized by calculating z-scores for each variable. Next, those z-scores were reduced to a smaller set of multi-dimensional components using principal components analysis. The analysis of results first examined the total variance explained.

Cardinality describes how the component affects a census tract's social vulnerability. For example, indicators such as race and poverty might increase vulnerability (+), others such as wealth decrease vulnerability (-). The six principal components are:

Principal component 1: Class (Poverty), Race (+)
Principal component 2: Age (Elderly) (+)
Principal component 3: Wealth (-)
Principal component 4: Urban, Females (+)
Principal component 5: Ethnicity (Hispanic) (+)
Principal component 6: High Occupancy Households (+)

Calculating the SoVI Score

Applying these cardinalities, the equation was derived from a simple mathematical algorithm:

(Principal component 1) + (Principal component 2) - (Principal component 3) + (Principal component 4) + (Principal component 5) + (Principal component 6)

This calculation performed in SPSS using the 'compute variable' function to execute column math. SoVI scores for each tract were joined to the South Atlantic census tracts shapefile in ArcMap so that they could be visualized.

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Medical Vulnerability

Research over the past two decades from epidemiology and public health has investigated the link between health and social vulnerability and the social characteristics of populations at highest health risk based on access to medical resources. These commonly-cited social characteristics that correlate with health care access include social status, social capital, and human capital. Social indicators of health risk help to identify sensitive populations, and indicators of health need identify individuals and communities with inherent medical vulnerability independent of ancillary factors.

Characteristics of Medical Vulnerability

The Medical Vulnerability Index (MedVI), borrowed the algorithmic approach for the construction of SoVI, and used principal components analysis to derive a multidimensional construct of medical vulnerability. The data for quantifying medical vulnerability relied on variables identified through a detailed literature review and expert identification provided by the Florida Department of Health as indicators of medically vulnerable populations across the state. Overall medical vulnerability is comprised by a multitude of factors which can be categorized into three broad categories:

Health Care Access: The first of the three categories utilized in the creation of this MedVI index centers on the identification of locations and populations within the state of Florida with less than adequate access to medical care. Lack of access or inadequate access to medical treatment facilities, physicians, emergency medical care, and primary medical treatment increases medical vulnerability.

Care System Capability: The second major component of medical vulnerability that is a requisite part for understanding how a place or population may be differentially impacted by disasters is the functional capabilities present within the health care system.

Medical Need: The third tenet of medical vulnerability centers on population health and the identification of characteristics that often combine to create adverse situations for at risk populations and quantification of characteristics related to poor health for the state.

Methodology

Below are the steps taken in the construction of the Medical Vulnerability Index (MedVI) for the Florida Department of Health at the tract level for Florida.

Sources of Data

Data used in the construction of MedVI were collected from several sources as per the data type and information necessary to represent medical need, healthcare access, and capacity.

Calculation of the MedVI Variables

Raw data from the sources were imported into Microsoft Excel for processing and standardization. A standard variable naming was used; where the prefix ‘Q’ represents a

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percentage of a population, and the suffix '_PC' represents a per capita measure. For other indicators that represent a calculated population ratio, the suffix 'R' or 'Rat' was used to make this distinction when naming the variables.

For most variables, the standardization process involved dividing the count of the subpopulation of interest by total population, or the total population of a group (such as those aged over 65 or less than age 18). Some variables did not require standardization, either because it was already provided as a percentage of the population (i.e. Florida CHARTS data), or because the data did not lend itself to further manipulation (County Health Rankings data, for example, is provided as a z-score).

Calculating the MedVI Score

In order to aggregate the indicators in a final MedVI Score, each variable was first normalized using min-max rescaling with the following equation:

(N – minimum value) / (maximum value – minimum value)

This normalization process, completed in Microsoft Excel, resulted in a set of values scaled between 0 and 1, producing a comparable range for each variable. This was beneficial, not only for aggregating the variables for the final index, but also preserving equal weight among each variable when calculating the MedVI score. Finally, this normalization method ranked the data in relative terms, allowing users to evaluate and compare and variable within a given area, and easily determine how each variable contributes to the aggregate index score after variables are combined. The normalized variables were summed based on their conceptual influence on medical vulnerability. If the variable illustrated increased medical need, low healthcare access, or diminished capacity, the variable was added to represent an increase in medical vulnerability. On the other hand, if a variable represented high healthcare access, capacity, or extraordinary resources, the variable was subtracted to indicate a reduction in overall medical vulnerability. Further calculations were performed in ArcMap using the 'field calculator' function. MedVI scores were spatially joined to their respective geography for visualization.

Hazard Vulnerability

The HVDE defines hazards as physical threats to lives and livelihoods. Following this concept, a hazard assessment is a multipart process in which hazard threats are first identified and described and then appraised for their likelihood of occurrence.

Identifying and understanding that all hazards affecting a place, community, town, county, or some larger area have origins that depend heavily on the primary causal agent of the loss causing event.

Many hazards, irrespective of the specific causal agent, share space as a common characteristic that enables comparison within and between places and hazards. The

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methodology utilized for the HVDE built on the aggregation of multiple hazards, use of a wider array of hazard characteristics and historical impacts, inclusion of the Social Vulnerability Index, the creation of a Medical Vulnerability Index, and implementation in a GIS framework at the US county scale. The outcome is a descriptive product (maps) that displays the spatial variation in hazard characteristics, social vulnerability, and medical vulnerability.

The Hazards of Place conceptual framework serves as the methodological foundation for the integrated approach used in the HVDE. The hazard potential of a place is uniquely tied to its geographic setting and social context to produce biophysical, medical and social vulnerability, which combine to produce the total vulnerability of a place.

Biophysical vulnerability is assessed at both the county and sub-county levels through the calculation of hazard frequency for sixteen different hazard events. The individual hazard frequency maps join to create an aggregate multi-hazard frequency surface. The multi-hazard frequency, social vulnerability, and medical vulnerability surfaces spatially combine to generate a representation of place vulnerability.

Methodology

The steps taken in the construction of the Hazard Vulnerability Index (HazVI) for the Florida Department of Health at the tract level for Florida are:

Sources of Data

Data used in the construction of HazVI for the State of Florida were collected from several sources as per the data type and information needed to represent each hazard type.

Preprocessing of Raw Data

This step varied for each hazard.

Calculation of Hazard Frequency

The historical frequency of occurrence is represented as the inverse of the period of record. For example, if there are 51 years of records, the frequency of each individual event is calculated as 1 divided by 51. Likewise, if historical frequency is calculated for discrete spatial events, such as earthquakes or hurricanes, the frequency for each event is equal to 1 divided by the number of years in record. For events that overlap spatially over a given area, this overlap is taken into account. For example, if separate sections of three different hurricanes overlap in a given area over a 100-year period, the historical frequency for that location is 3/100, or 0.03. This logic was used to determine historical hazard frequency for each hazard type that included a historical record (i.e. earthquakes, hurricane winds, and SHELDUS events). Similarly, for flood hazards, the expected return interval was used to approximate hazard frequency, where 100-year floods have a frequency of 1/100, or 0.01 and 500-year floods have a frequency of 1/500, or 0.002.

For hazard events that did not include a historical record, the probability or occurrence was substituted for historical frequency. For wildfires, this was simply the probability of an

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acre burning if ignited, averaged for each census tract. For storm surge, an average probability of occurrence was determined using the regional storm landfall probabilities provided by Dr. William Gray's US Landfalling Hurricane Web Project (http://e-transit.org/hurricane/welcome.html). Different probabilities were derived based on spatial location and hurricane strength. If a surge zone inundated a county that was not listed in any of the landfall probability regions, the surge direction and source of wind/floodwater was assessed visually and an appropriate region was assigned on an ad-hoc basis.

Calculating the HazVI Score

Once the procedure for determining hazard frequency was completed for each hazard type, the frequencies were summed in each spatial unit and overlapping area to develop a multihazard frequency map.

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