Analytic Methods for HIA: Innovative tools for quantitative analysis

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National Health Impact Assessment Meeting
April 3, 2012

HIAs examine multiple impacts and pathways

Pathways for an HIA on mass transit funding

1. Air and water pollution;
2. Household discretionary income;
3. Community economic conditions;
4. Physical activity;
5. Social capital and mental health;
6. Discretionary time;
7. Access to social and health services;
8. Land-use patterns.

Elaborating causal pathways

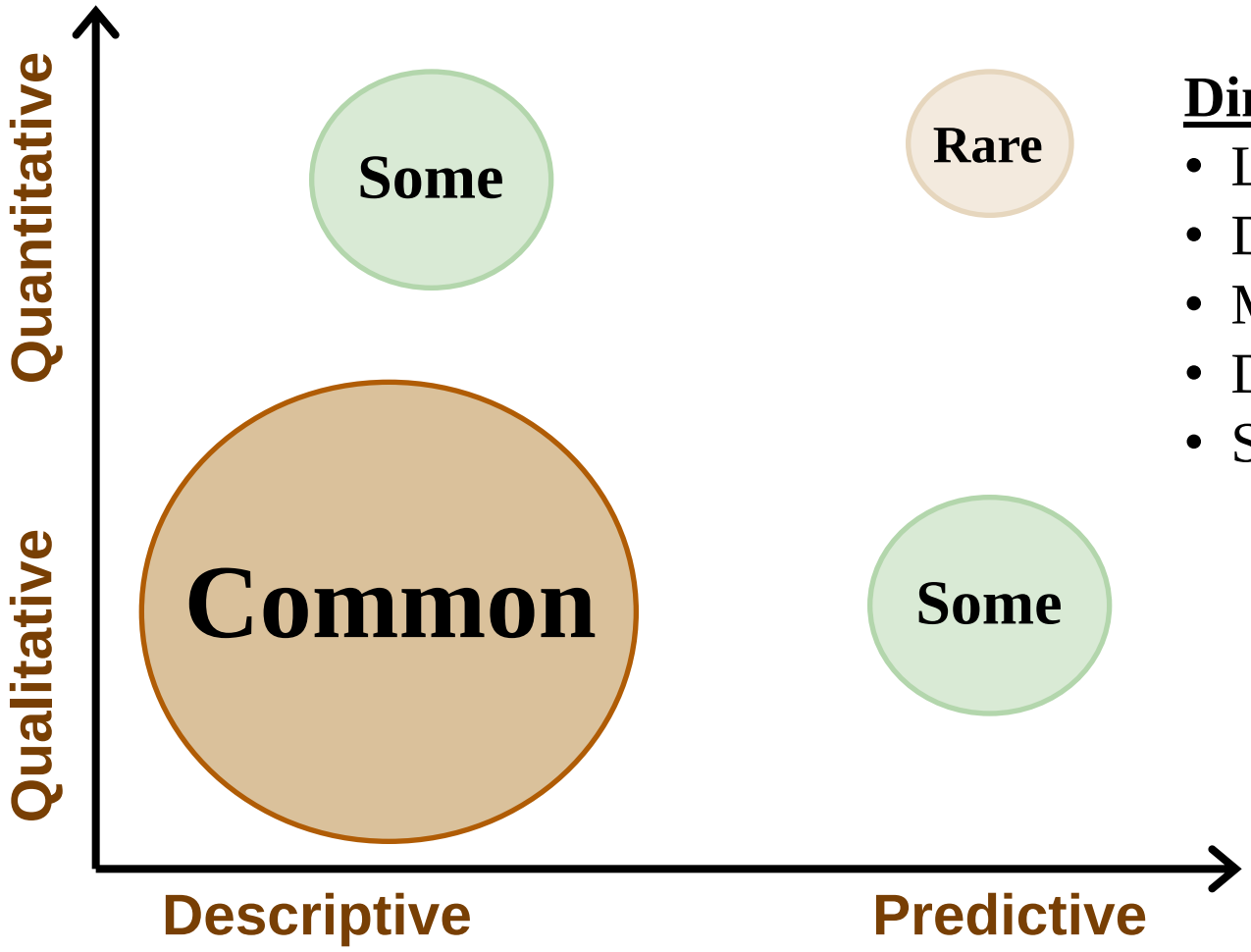
A good HIA should:

1. Explain these linkages;
2. Describe the strength and consistency of evidence, including a balanced discussion of limitations and disconfirmatory evidence;
3. Give a sense of the likelihood, direction, magnitude, distribution and significance of these impacts;
4. Compare alternatives (e.g. action/no action, with/without mitigation).

Value of Quantitative Analysis in HIA

1. **Compare of alternatives and components**
   e.g. ped/bicyclist injury rates associated with different roadway features
2. **Understand and explain potential trade-offs**
   e.g. (a) air pollution improvements vs. exacerbation resulting from a mandatory 55 mph speedlimit, (b) equity trade-offs associated with increased gas tax
3. **Force clear specification of alternatives**
4. **Distill large amounts of information**
5. **Combine with cost information to estimate cost-effectiveness**
6. **Compare other policies and HIAs**
   e.g. comparison of air quality improvements from carbon cap & trade, vehicle fuel efficiency standards, home insulation
7. **Build credibility** (important not to over-simplify to create just a patina of credibility)

Quantification and prediction of impacts in HIA

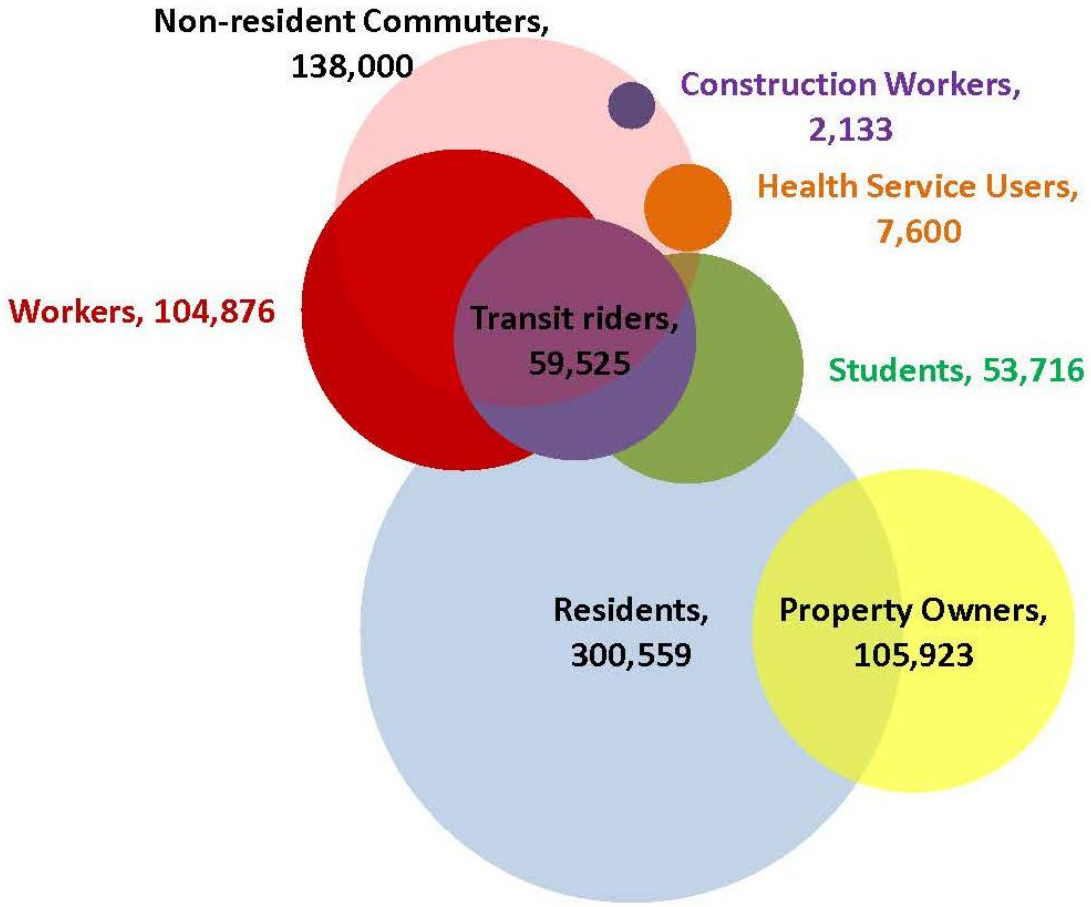


Dimensions of impacts

- Likelihood
- Direction
- Magnitude
- Distribution
- Significance

Description of affected populations

(from Wilshire Transit HIA, UCLA Health Impact Project)



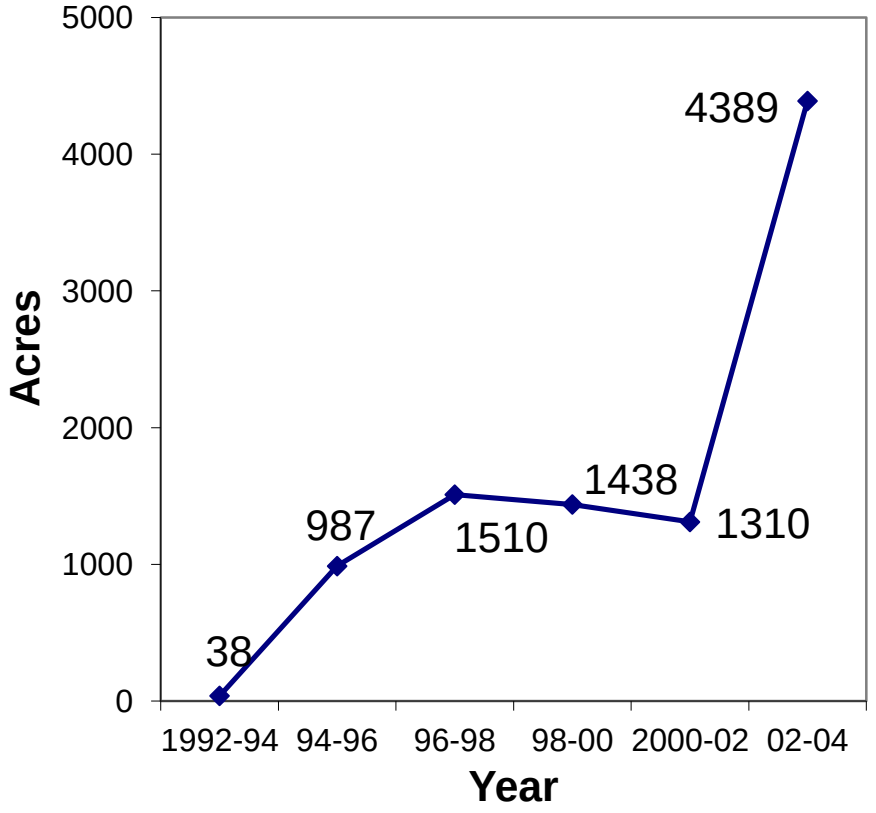
Description of affected populations and issues

(from Wilshire Transit HIA, UCLA Health Impact Project)

Vulnerable Groups		Residents (N=300,559)	Transit Riders (N=59,525)	Vulnerabilities of concern
Young children (0-5 years)		17,335	6,548	Air pollution, noise, nutrition
Older children (6-17 years)		33,460		Social factors, mobility, physical activity, personal security
Elderly (65+)		38,472	2,976	Mobility, physical activity, social isolation, personal security, access to services
Women		150,881	30,358	Personal security
Poverty: household income below **100% Fed poverty level** **200% Fed poverty level**		64,925 138,698	income<$26,000 per year (2002$) 40,477	Mobility, personal security, nutrition, housing
Homeless		10,009	---	Mobility, isolation, personal security, housing, access to svcs
Health Status	**Disabled adults**	49,204	---	Mobility, social isolation
	Adults w/o health insurance	73,181	---	Access to health/social svcs
	Obese adults	38,214	---	Nutrition, physical activity
	Children w/special health needs	7,416	---	Mobility, access to services
	Children with asthma	2,540	---	Air pollution

Description of current conditions: Framing a problem

New housing development near Bakersfield, California (From GoogleEarth, 2008)

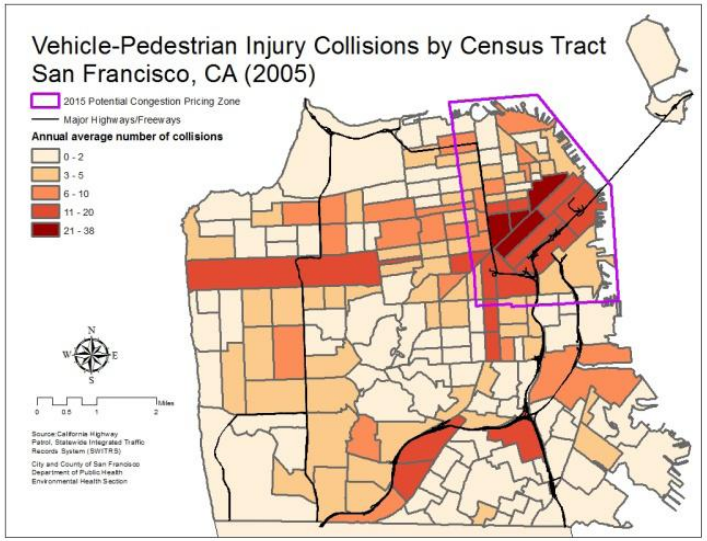


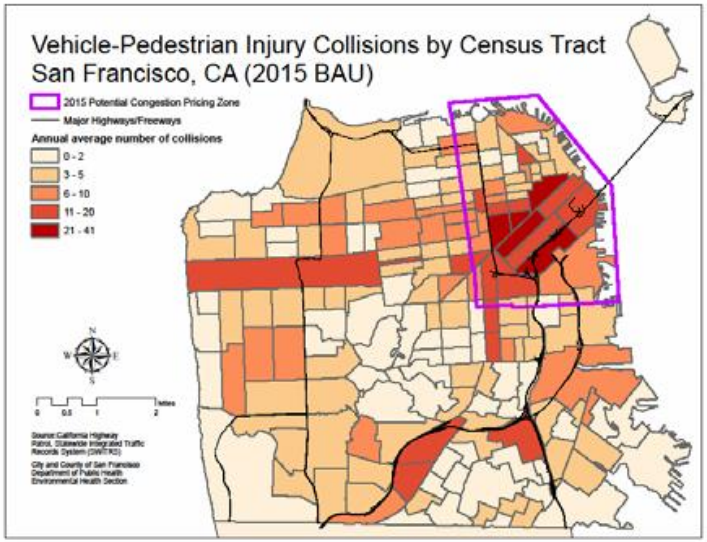
Acres per year of "important" farmland converted to urban/built-up use Kern County, California 1992-2004. Data from California Dept. of Conservation.

Prediction of impacts

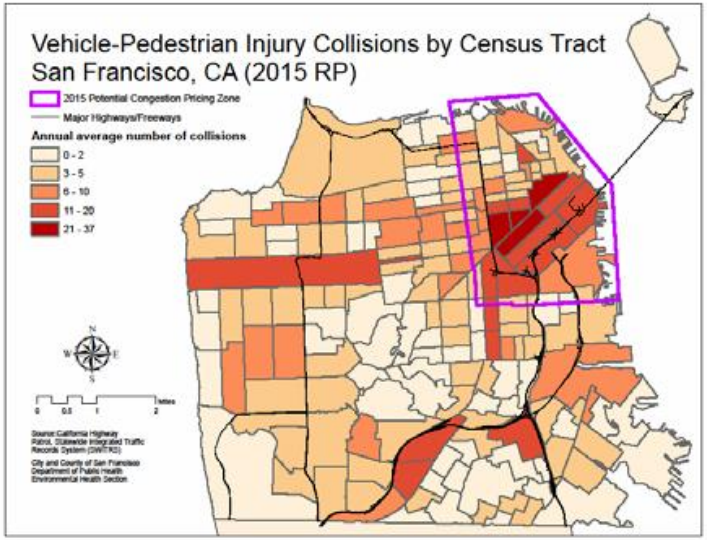
San Francisco Roadway Pricing HIA, San Francisco DPH)

Pedestrian and Bicyclist Injury Rates by Census Tract 2005





2015 Business-as-usual)

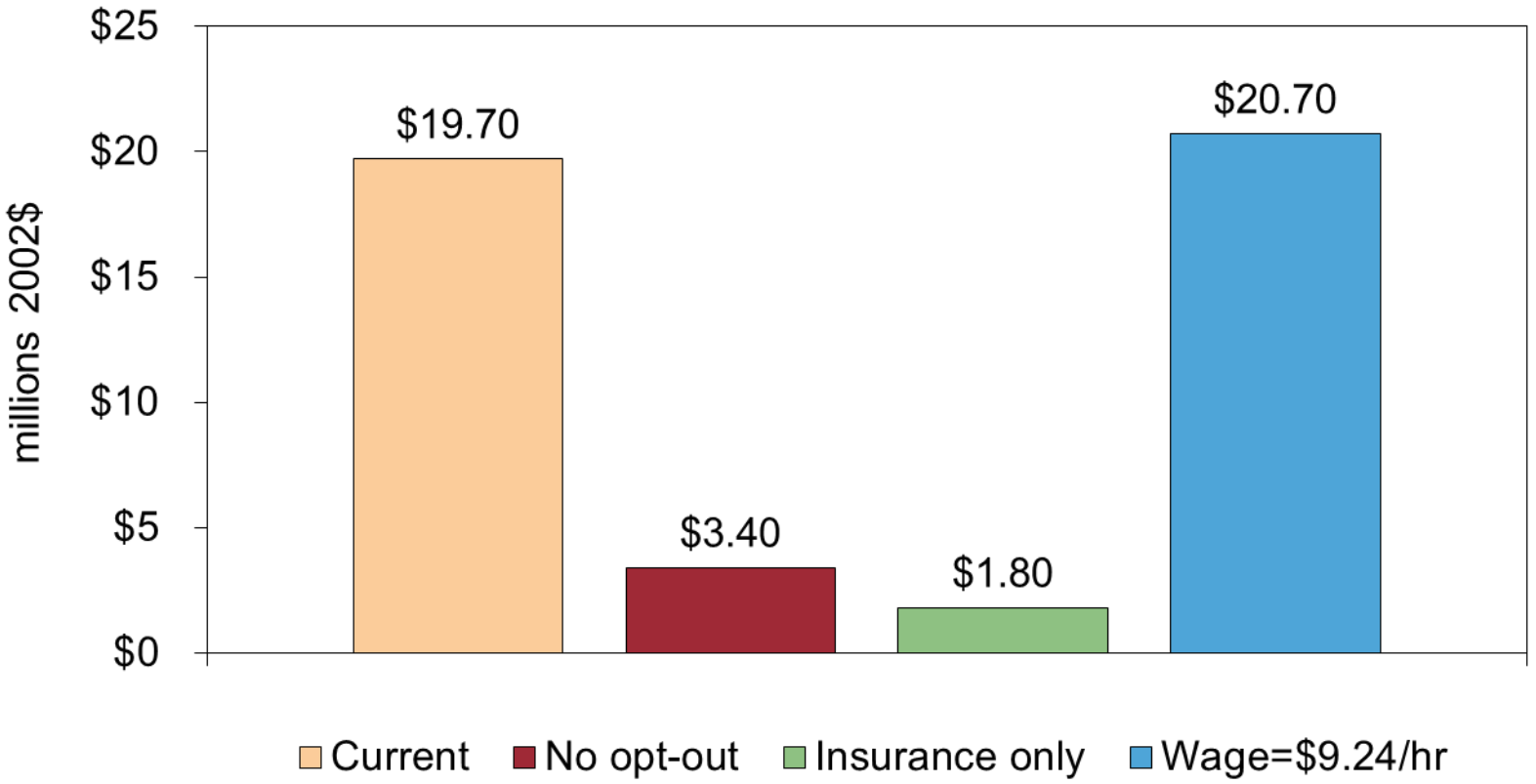


2015 w/ Roadway Pricing

Prediction of impacts

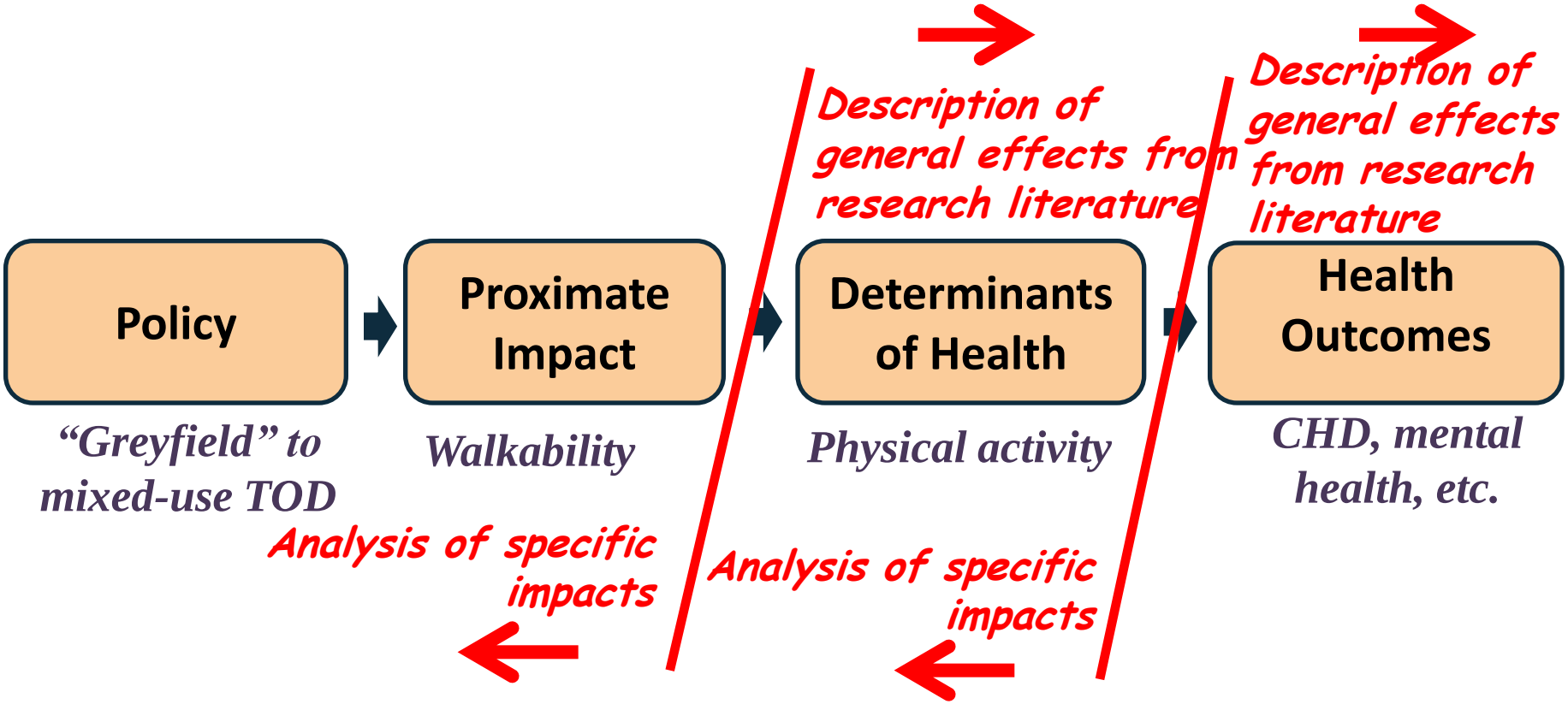
Los Angeles Living Wage Ordinance – UCLA Health Impact Project

Annual Direct Program Costs per Death Avoided



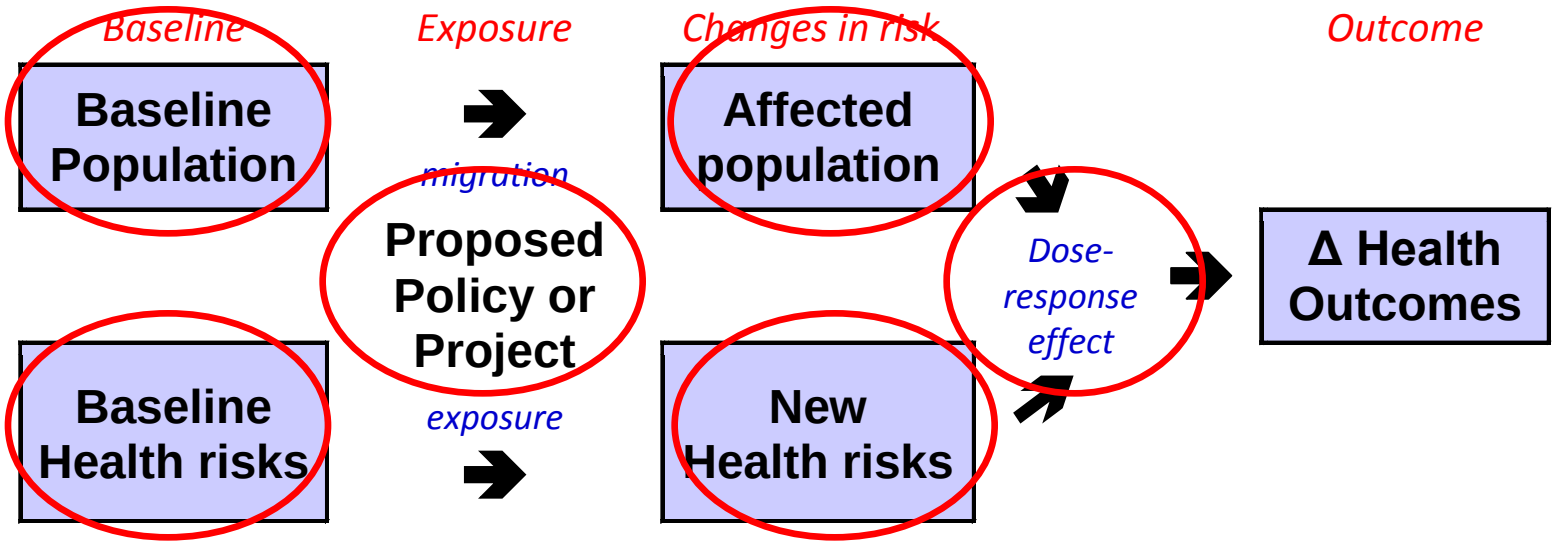
Policy Options for Amending Living Wage Ordinance

Example of a causal pathway in HIA



Impact assessment

General paradigm from risk assessment



Data needs

1. Clearly defined policy
2. Definition of the population of interest
3. Baseline distribution of risk factors (i.e. exposures) in the affected population
4. Change in the prevalence and distribution of risk factors resulting from policy
5. Change in the composition of the affected population resulting from policy
6. Dose-response relationship between risk factors and health outcomes

Data needs: Definition of the proposed policy

Existing policy requires that employees working on city contracts must be:

- Paid at least $7.99/hour(adjusted annually)
- Provided health insurance or an additional $1.25/hour if employer does not provide health insurance ("*opt-out provision*");
- Provided 12 paid leave days per year (e.g. sick leave, vacation, etc.)

Covers approximately 10,000 workers.

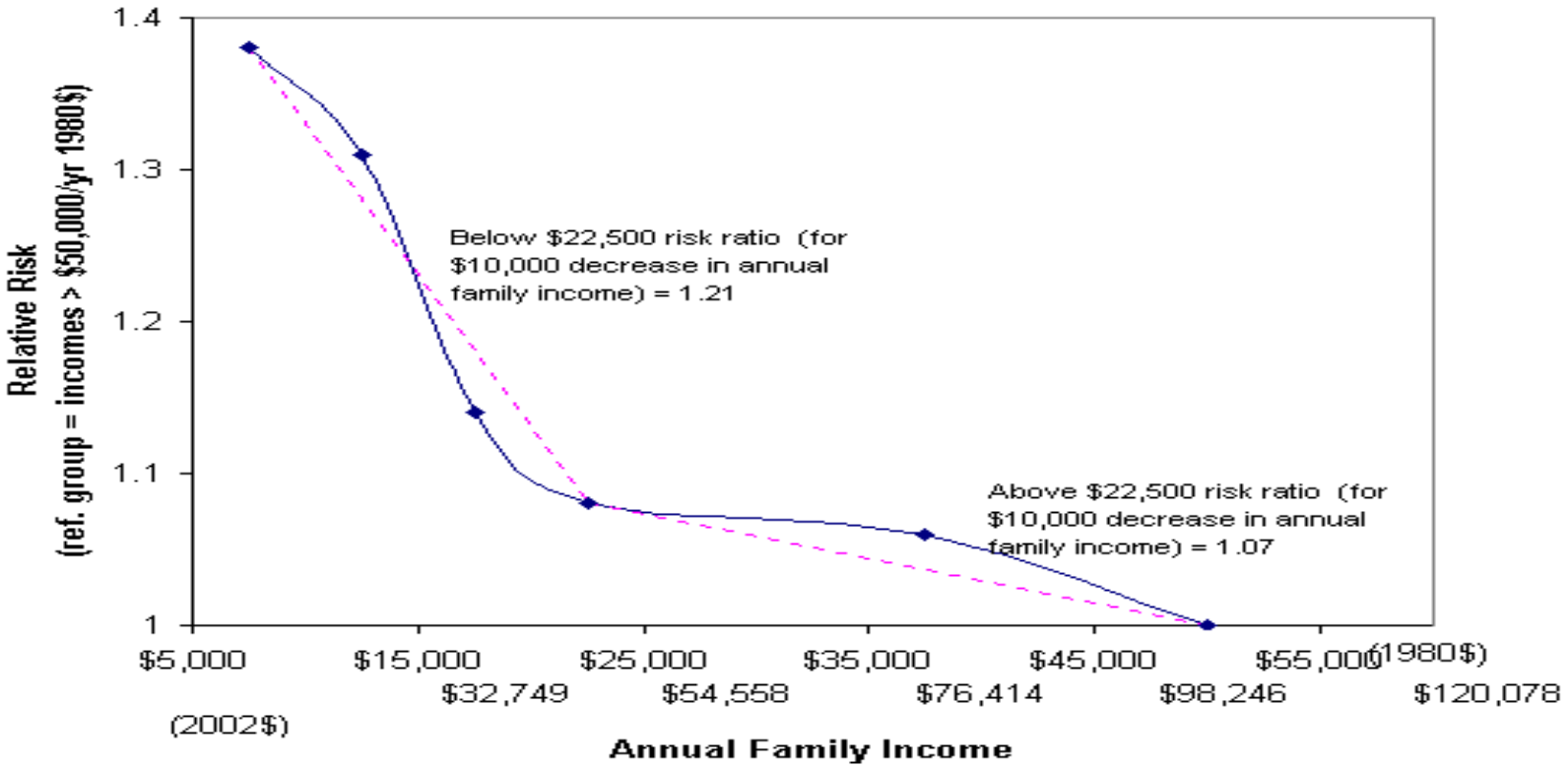
Alternatives would alter existing wage or insurance requirements

Data needs: Definition of the affected population

		No. workers subject to LA living wage ordinance
Wages	$6.75/hr	5,800
	7.75	2,500
	8.75	1,700
Health Insurance	Yes	4,000
	No	6,000
Total		10,000

Data needs: Dose-response relationships (*income*)

Dose-response relationship – Income
(from Backlund et al, 1999)



NE Plaza Redevelopment, Atlanta

Projected effects on walkability and walking

Before

Average Ped-L.O.S. = D (4.1)
Avg min. walked/week = 51
(*estimated avg for Atlanta MSA, NHTS, 2001*)

After

Ped-L.O.S. = B- (2.4)
Increase of 11-75 min. walking/wk

"Pedestrian Level-of-Service (Ped-LOS)
http://www.kcmo.org/planning.nsf/plnpres/walkability

Questions to answer in the analysis

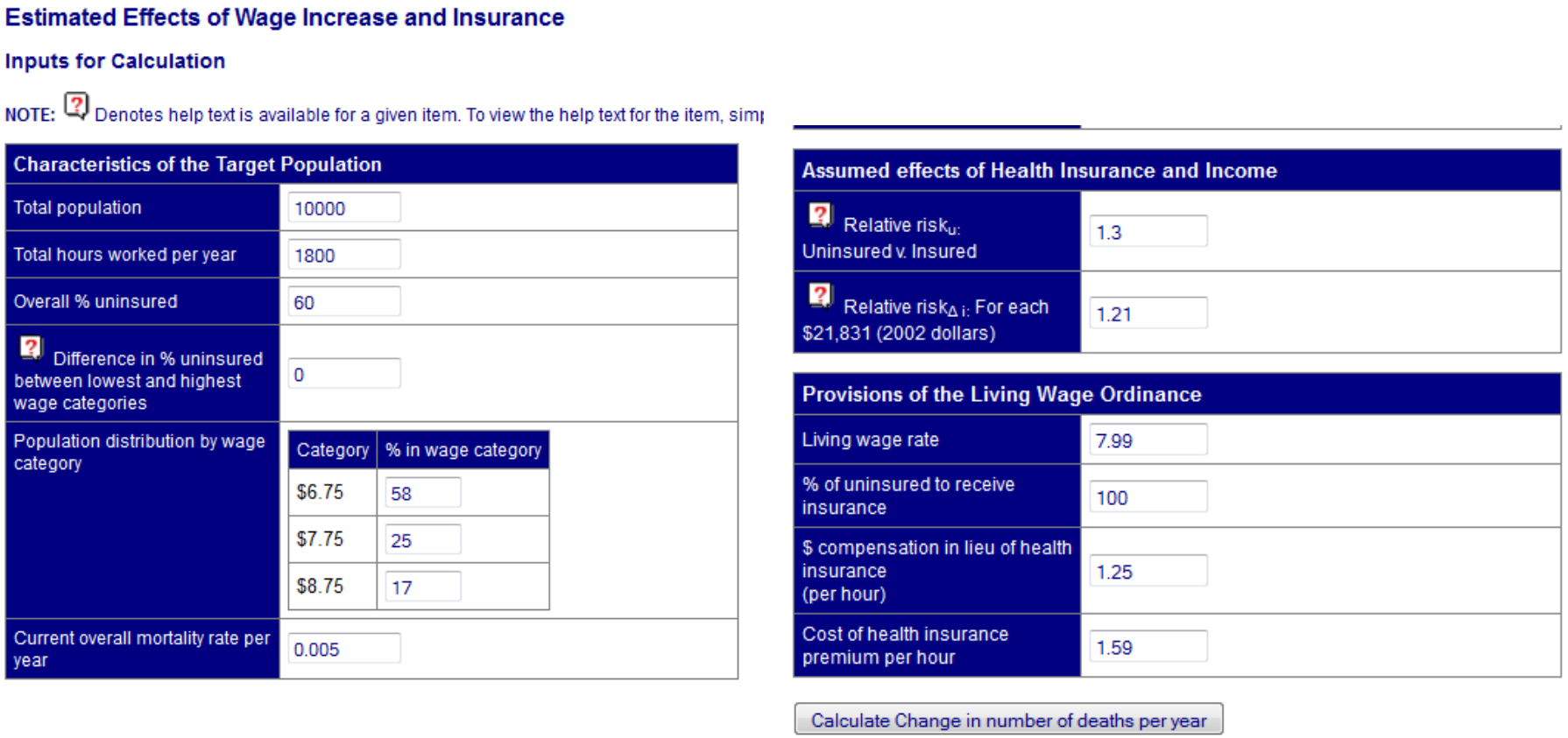
1. What is the proposed policy? What are the alternatives?
2. What are the potential health effects and pathways?

For each pathway

1. What is the affected population?
2. What is the current prevalence and distribution of related health conditions and exposures? *(including both health risks and protective factors)*
3. How will these exposures change as a result of the proposed policy?
4. What is relationship between these exposures and health conditions? How strong is the evidence?
5. What is the likely change in magnitude, and range of possible effects?
6. Will these changes exacerbate existing health disparities?
7. Are there feasible policy alternatives that would help minimize potential harm or maximize benefits?

Tools to facilitate quantitative analysis across HIAs

Calculators: Living Wage Health Impact Calculator



Estimated Effects of Wage Increase and Insurance

Inputs for Calculation

NOTE: Denotes help text is available for a given item. To view the help text for the item, simp

Characteristics of the Target Population	
Total population	10000
Total hours worked per year	1800
Overall % uninsured	60
Difference in % uninsured between lowest and highest wage categories	0
Population distribution by wage category	Category: % in wage category $6.75: 58 $7.75: 25 $8.75: 17
Current overall mortality rate per year	0.005

Assumed effects of Health Insurance and Income	
Relative $risk_u$: Uninsured v. Insured	1.3
Relative $risk_{\Delta i}$: For each $21,831 (2002 dollars)	1.21

Provisions of the Living Wage Ordinance	
Living wage rate	7.99
% of uninsured to receive insurance	100
$ compensation in lieu of health insurance (per hour)	1.25
Cost of health insurance premium per hour	1.59

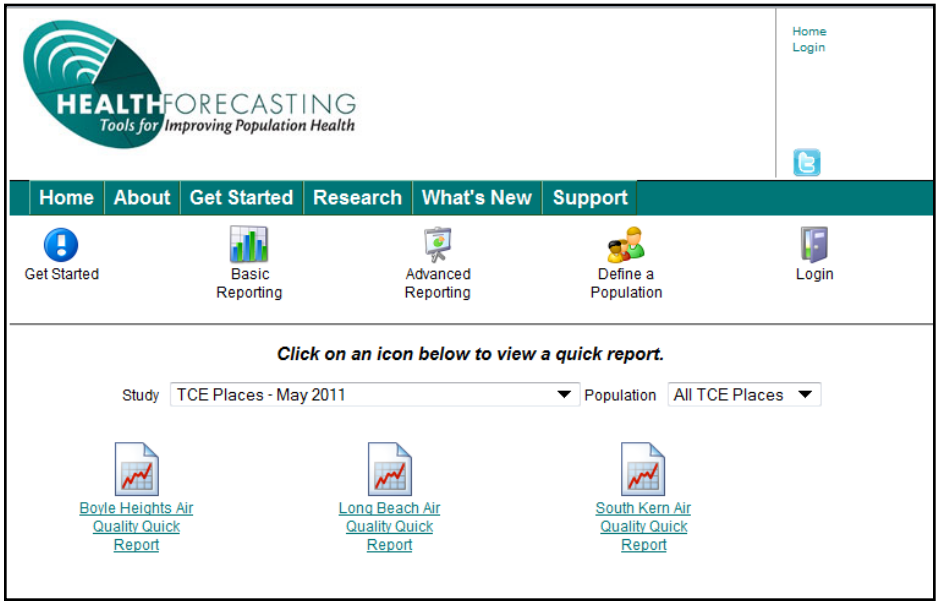
Calculate Change in number of deaths per year

Available at http://www.ph.ucla.edu/hs/health-impact/index.php

Tools to facilitate quantitative analysis across HIAs

Population-based Microsimulation

Population-based microsimulation is still in its nascence, but it offers a potentially powerful tool to examine the interaction of multiple health effects over long time horizons using a life-course trajectory



UCLA Health Forecasting Project

Available at http://www.health-forecasting.org

Other microsimulation health models being developed by:

Statistics Canada

http://www.statcan.gc.ca/microsimulation/health-sante/health-sante-eng.htm

Dynamo HIA Project

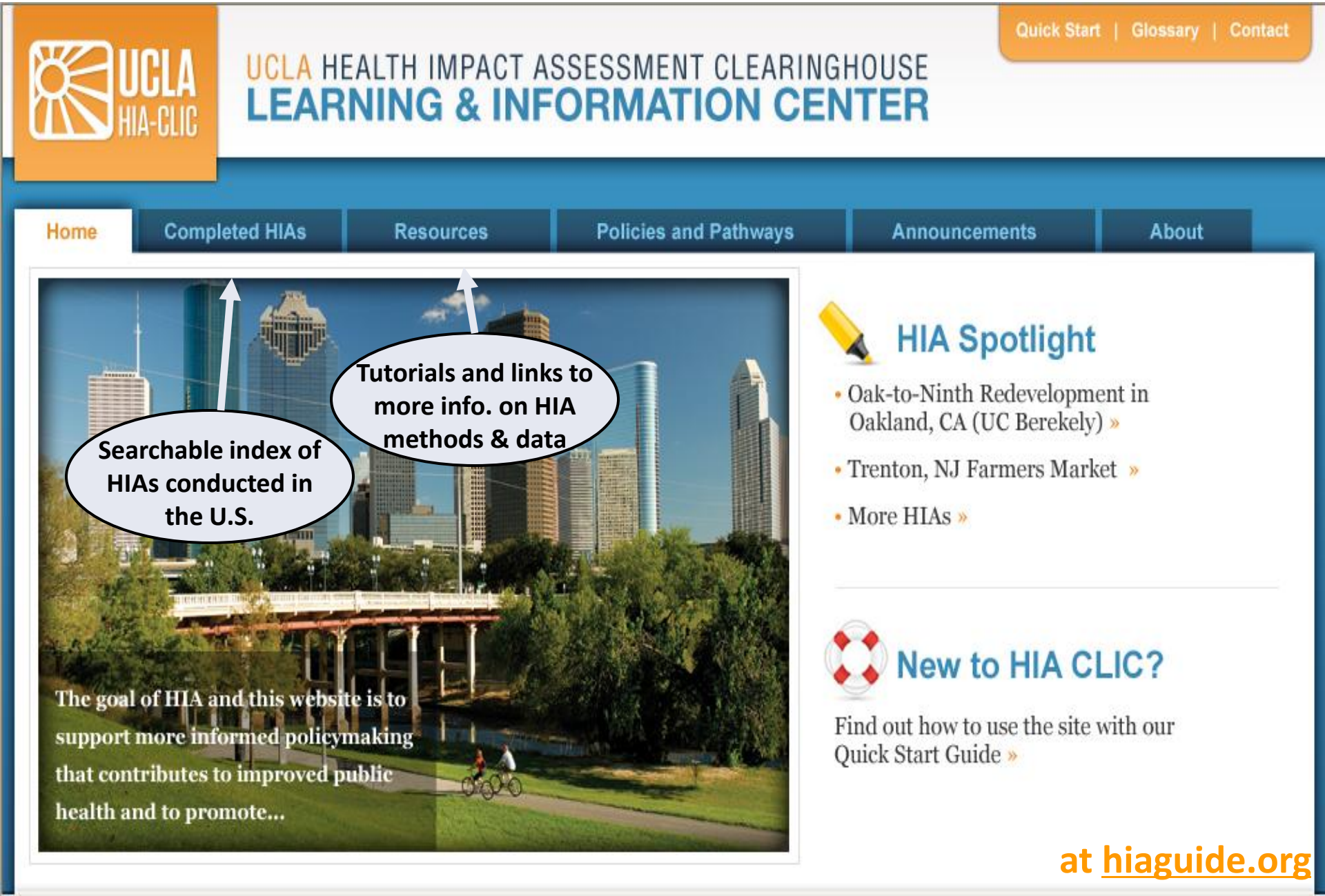
http://www.dynamo-hia.eu

Tools to facilitate quantitative analysis across HIAs

Calculators: Health Economic Assessment Tools (HEAT)

Available at
http://www.heatwalkingcycling.org/index.php

HIA-CLIC: An on-line resource for more information on HIA



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