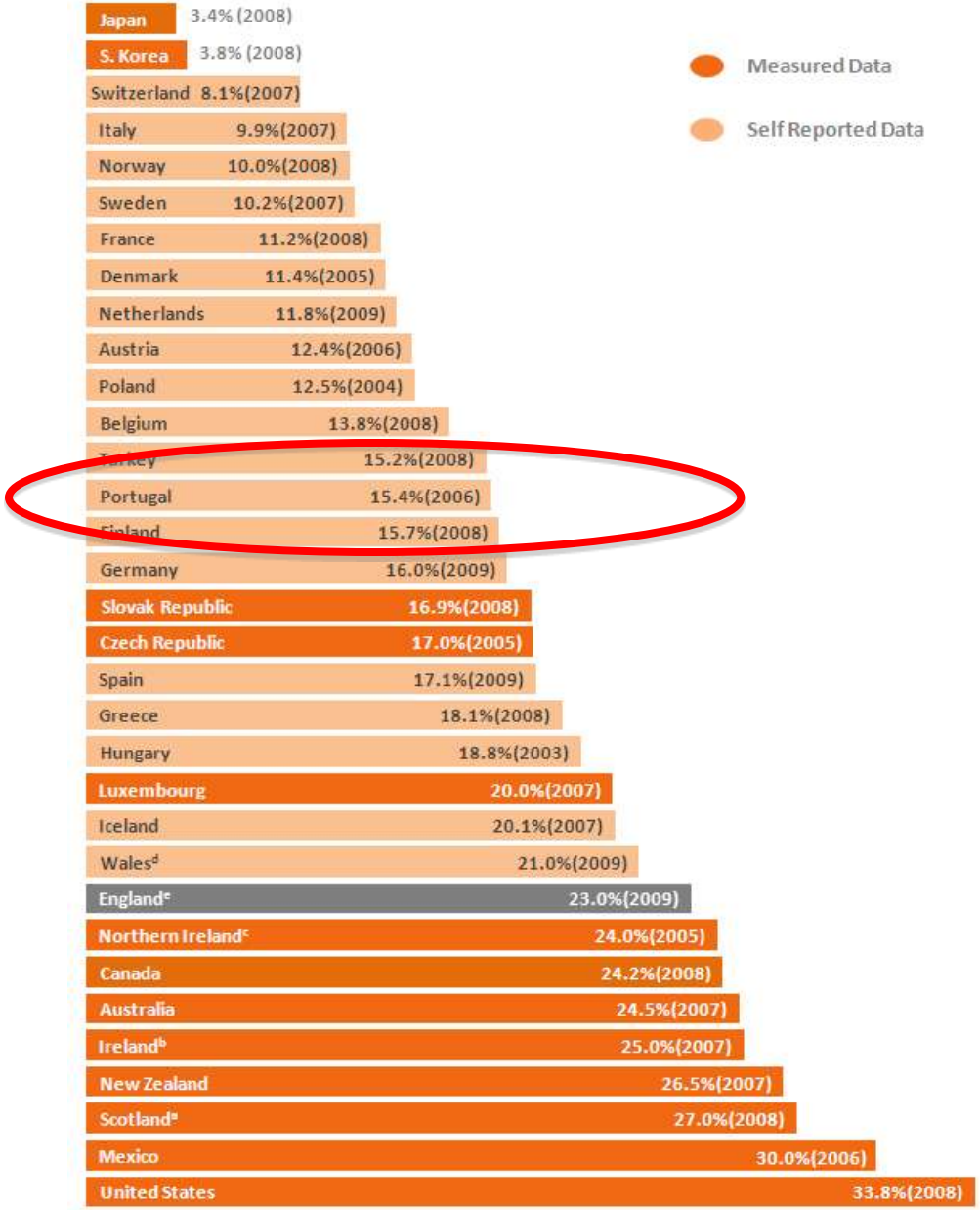
Health promotion and disease prevention within complex systems: diet, physical activity, and obesity

Harry Rutter
@harryrutter

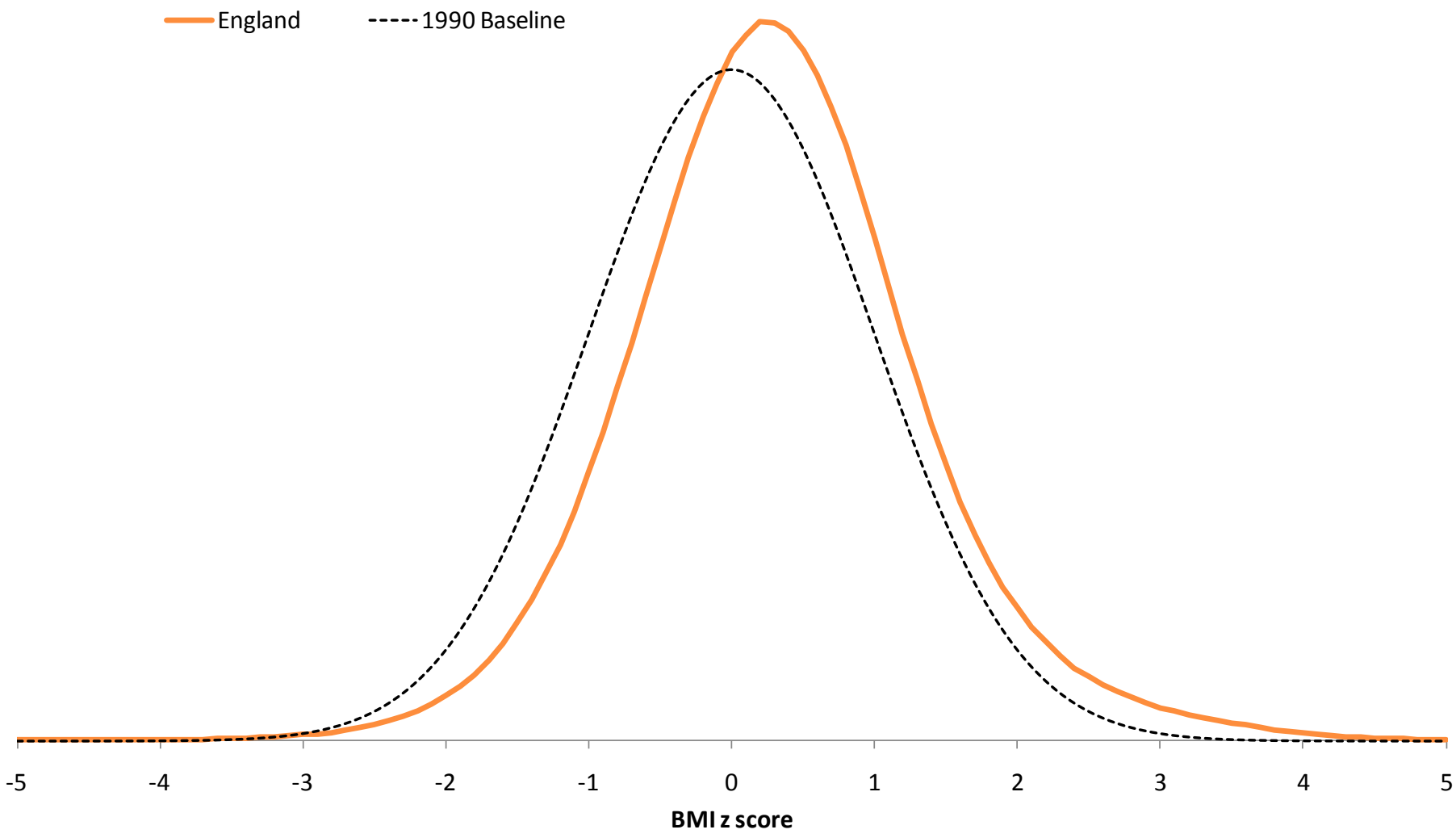
Adult obesity prevalence, latest available data*



http://www.noo.org.uk/NOO_about_obesity/international/

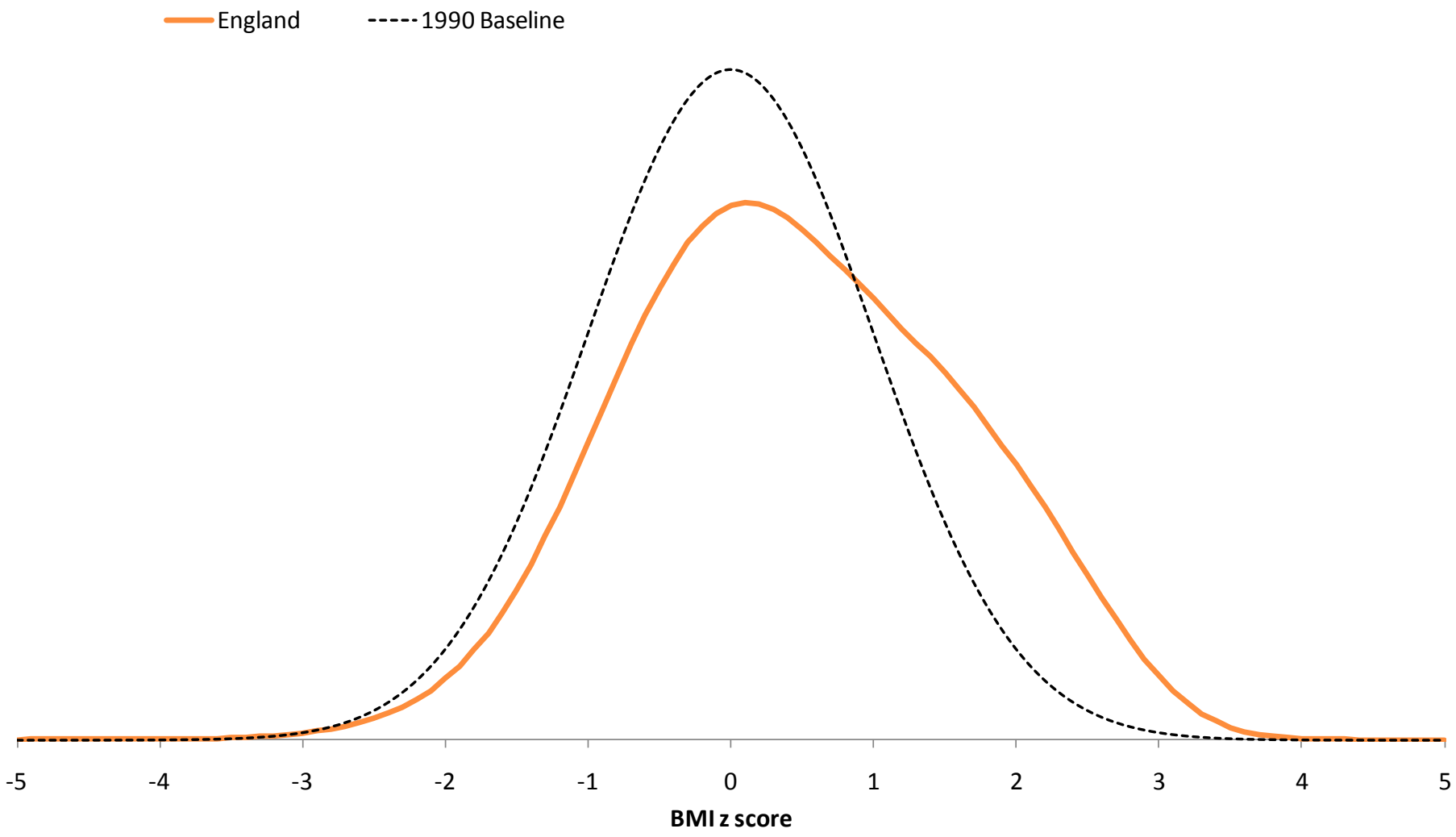
BMI distribution: Reception children

National Child Measurement Programme 2007/08 to 2009/10 (pooled)



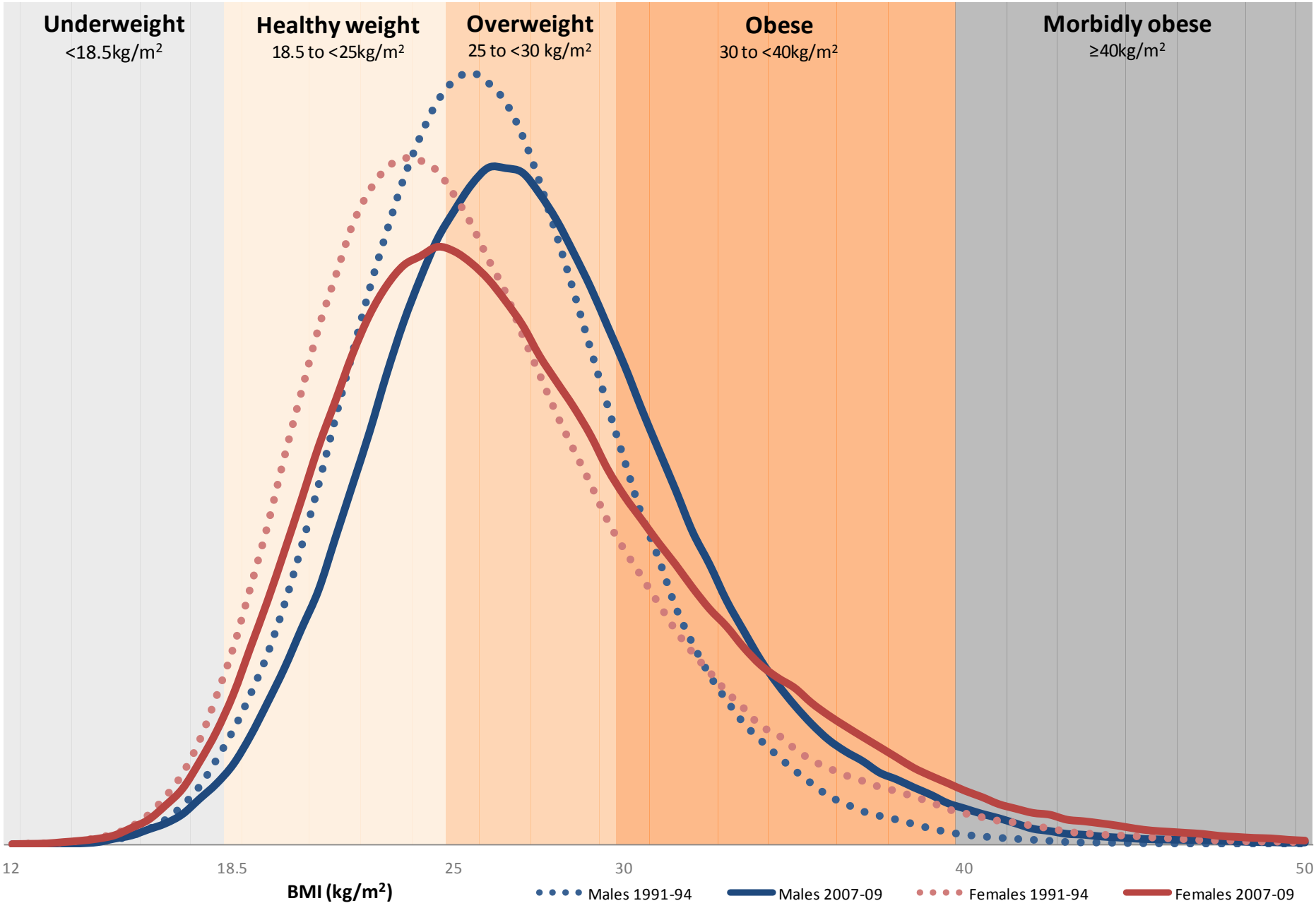
BMI distribution: Year 6 children

National Child Measurement Programme 2007/08 to 2009/10 (pooled)



Adult (aged 18+) BMI distribution

Health Survey for England 1991-94 and 2007-09



Why is this happening?


BURGER KING
BURGER KING
£1.99


EIGHT GUIDELINES FOR A HEALTHY DIET
Enjoy your food
Eat a variety of different foods
Eat the right amount to be at a healthy weight
Eat plenty of foods rich in starch & fibre
Eat plenty of fruit & vegetables
Don't eat too many foods that contain a lot of fat
Don't have sugary foods & drinks too often
If you drink alcohol, drink sensibly
MAFF


Platforms
13 and 14
11
HELP WITH THE BILLS
FIGHTER

The bigger picture

Noncommunicable diseases and mental health

Noncommunicable diseases and mental health
About NMH
Countries
Health topics
Publications
Databases
Media centre
Events
Global Forum on NCDs
Moscow NCDs 2011
UN high-level meeting on NCDs

United Nations high-level meeting on noncommunicable disease prevention and control

NCD summit to shape the international agenda

Date: 19-20 September 2011
Place: New York, USA

Noncommunicable diseases - or NCDs - like heart attacks and strokes, cancers, diabetes and chronic respiratory disease account for over 63% of deaths in the world today. Every year, NCDs kill 9 million people under 60. The socio-economic impact is staggering. Global leaders will meet at the United Nations in New York from 19-20 September 2011 to set a new international agenda on NCDs.

This is only the second time in the history of the UN that the General Assembly meets on a health issue (the last issue was AIDS). The aim is for countries to adopt a concise, action-oriented outcome document that will shape the global agendas for generations to come.

Meeting outcomes

Political declaration adopted at the UN General Assembly - 18 September 2011

Statements, speeches

Opening remarks by the President of the General Assembly
pdf, 36kb

Closing remarks by the President of the General Assembly
pdf, 41kb

Facts about NCDs

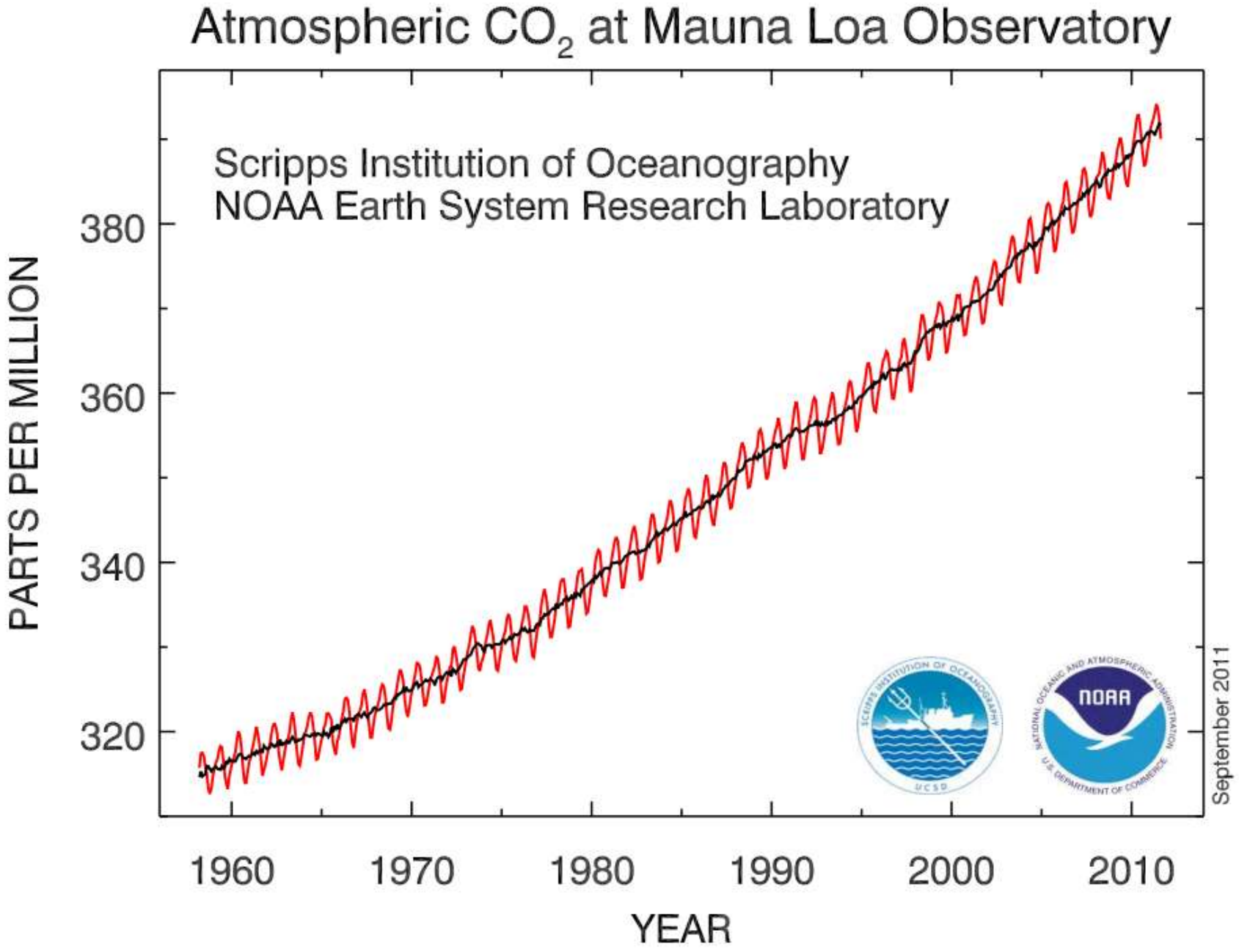
- 36 million people die annually from NCDs.
- 63% of all global deaths are due to NCDs.
- 9 million people die too young from NCDs, before the age of 60.

– 10 facts on NCDs
– Fact sheets on chronic diseases

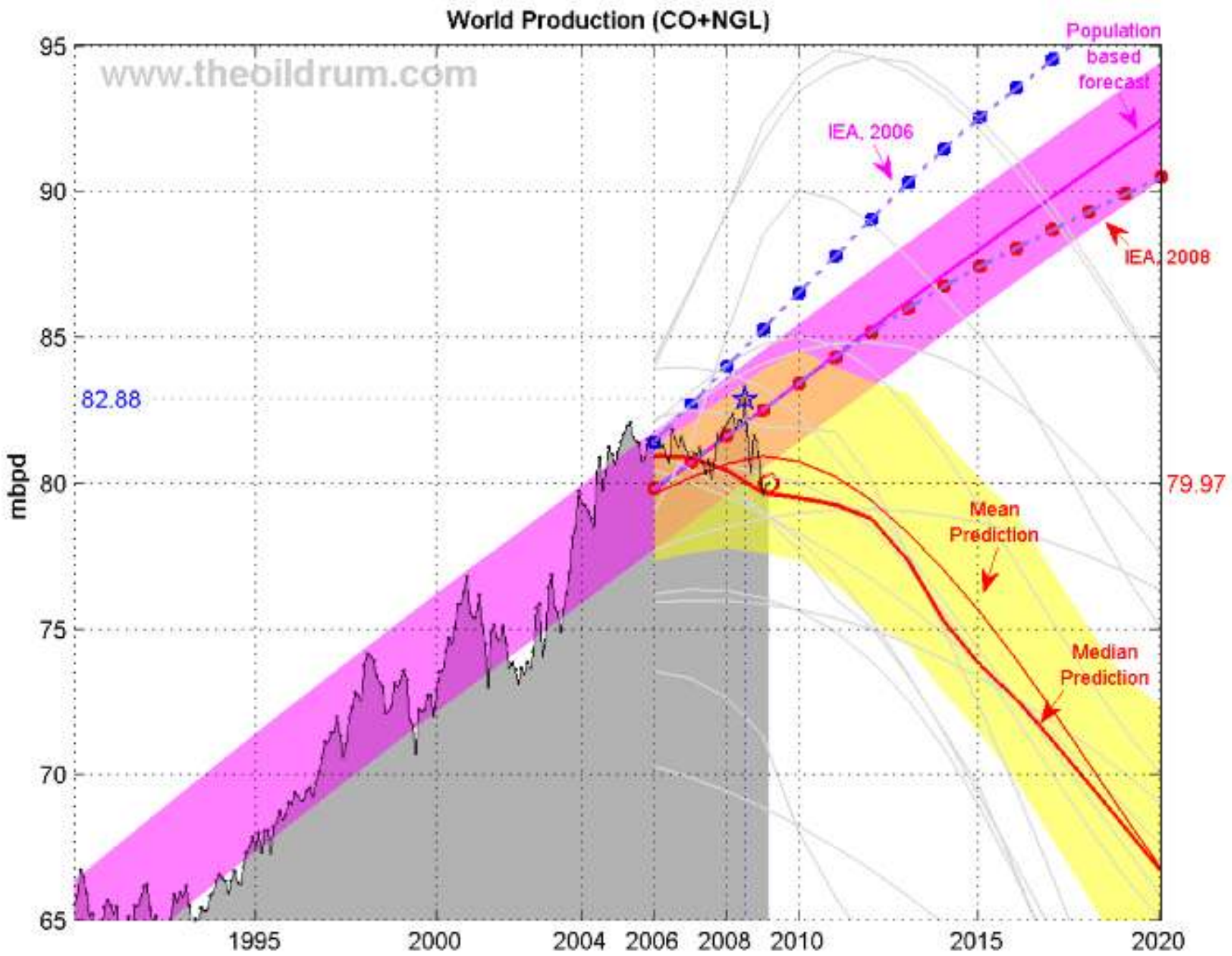
WHO contacts
External Relations Officer


100 EURO
200 EURO
500 EURO
EURO

Tabula Rosa, 2004. Borjana Ventzislavova, Miroslav Nicic & Mladen Penev: http://www.adbusters.org/content/brand-baby-1

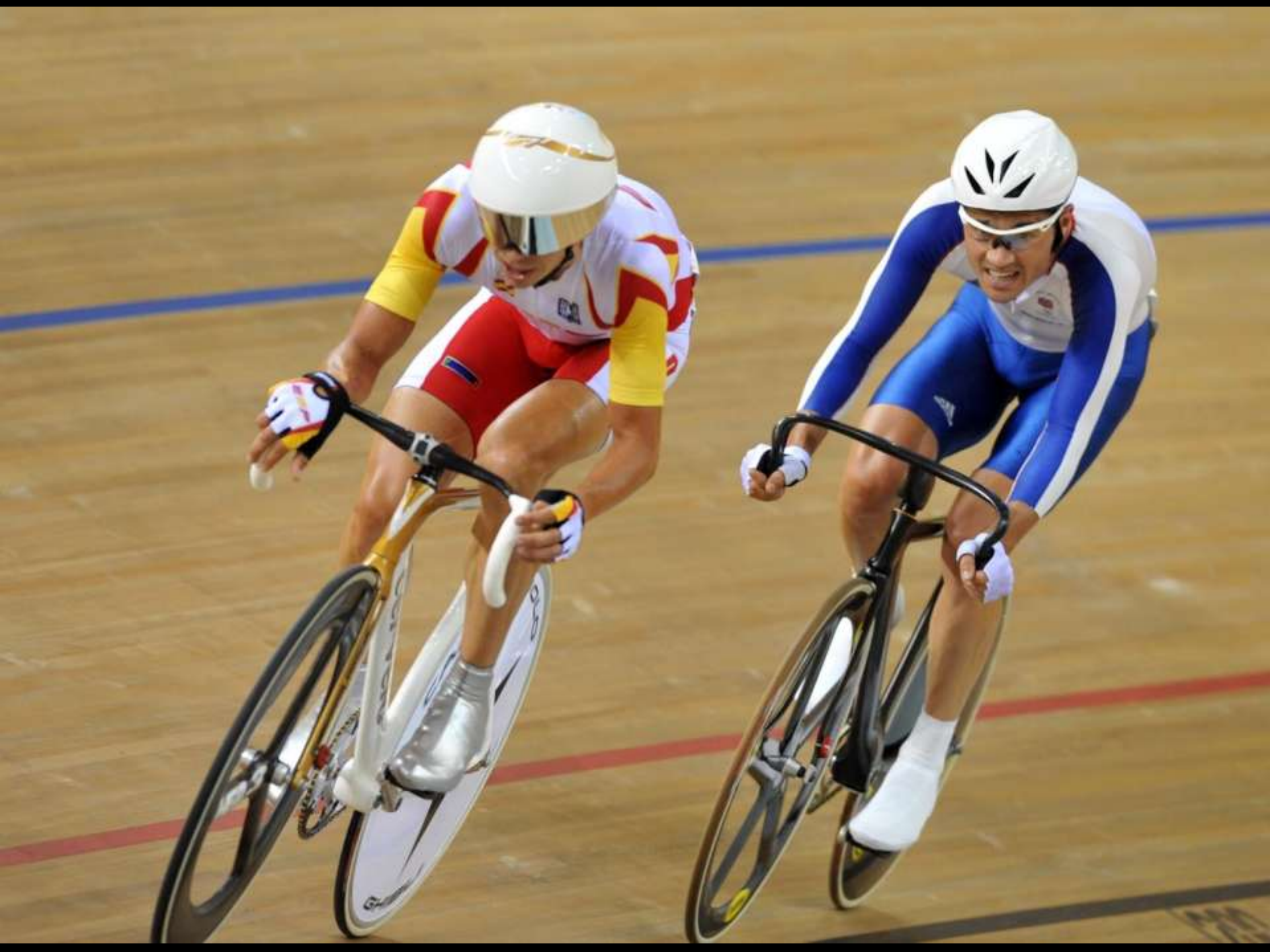


Source: http://www.esrl.noaa.gov/gmd/ccgg/trends/



http://www.theoildrum.com/node/5521

How do we respond?

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T209 TND
Blackbird Leys
Templars Square
Cowley Road
city centre
every 6 mins Mon-Sat daytimes
Join our driving team
BREAKDOWN COVER £35
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fcuk
barrotts


NO
CYCLING

http://www.thenutritionpost.com/eatright/do-fast-food-customers-read-the-calorie-charts.html

Food | Restaurants | People | Our world | Sport | About us

Grilled Chicken Salad

Available with Grilled* or Crispy Chicken and your choice of Caesar or Balsamic dressing.

What's your favourite McDonald's salad?

Chicken — Vote

Chicken & Bacon — Vote

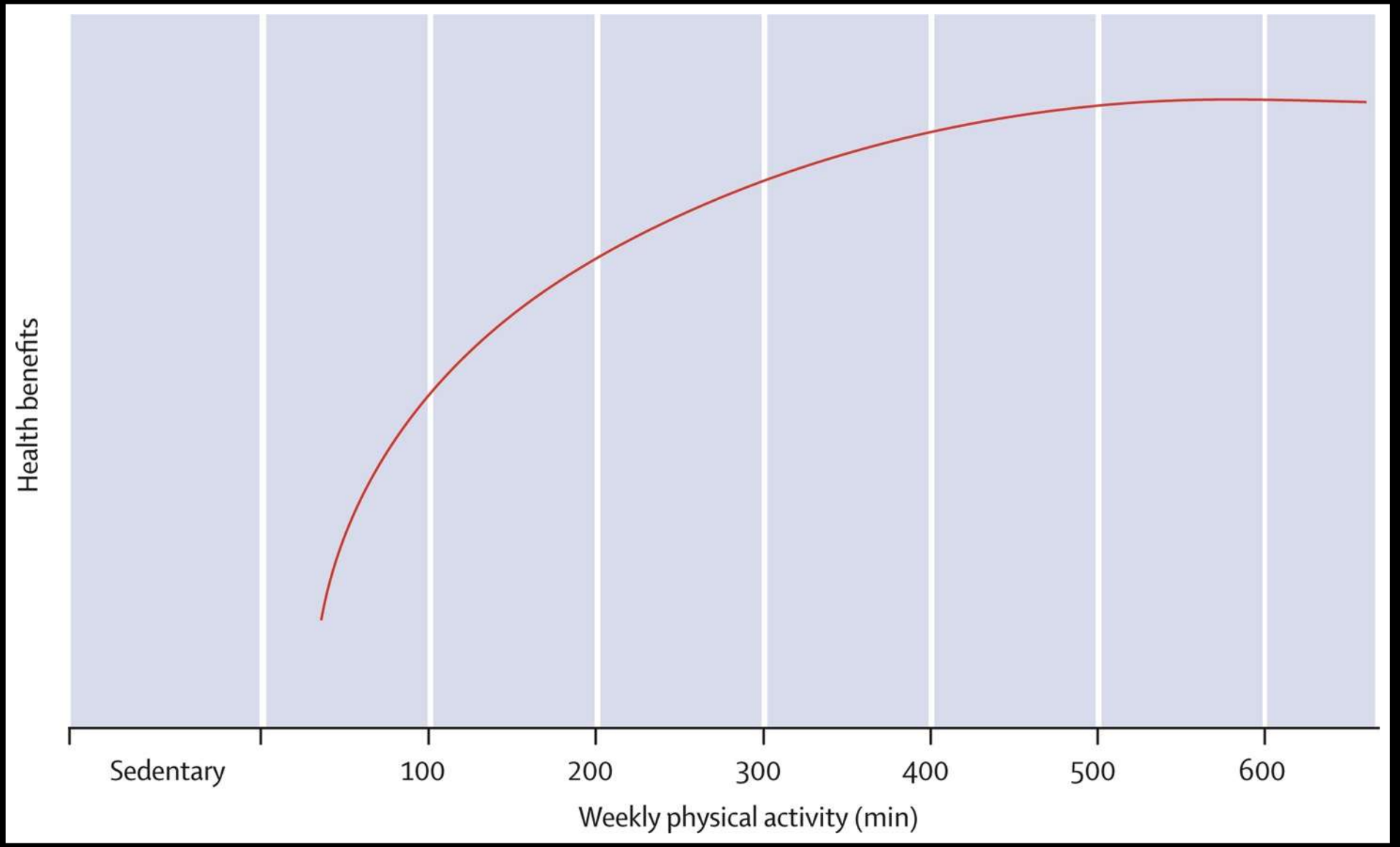
About the Grilled Chicken Salad

See all ingredients

The only meat we use across our entire chicken range is succulent chicken breast meat.

You are in Food / Salads

How should we respond?



Source: The Lancet, Volume 378, Issue 9798, Pages 1202 - 1203, 1 October 2011

Source: http://www.kryztoff.com/RAW/wp-content/uploads/2011/08/street-games-web.jp

Source: http://www.bikingindallas.com/wp-content/uploads/Ciclovia7a.jp


crete


Chicos
SILVER
Panduro
Panduro

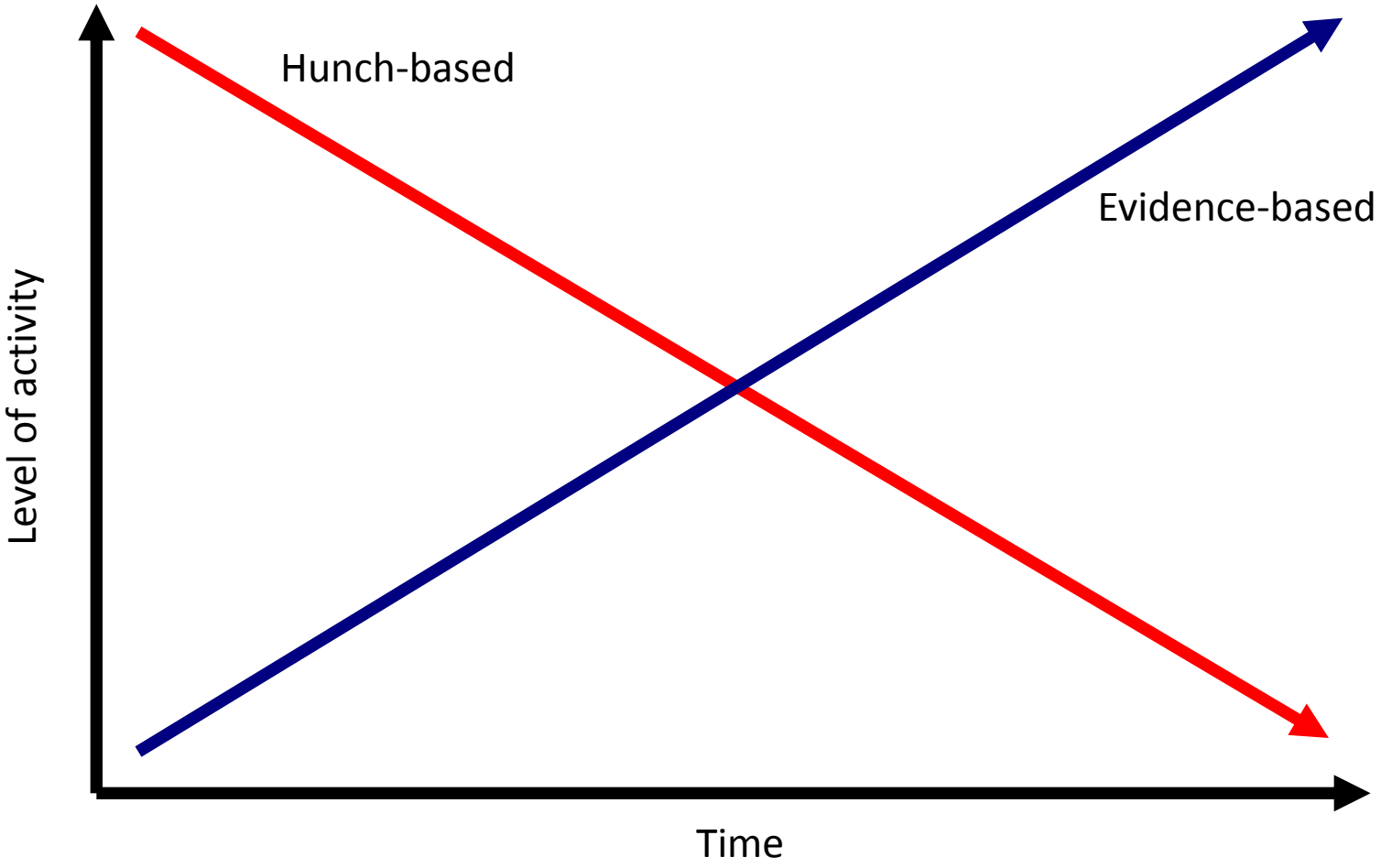

BGN 111


Mellanmjölk
Mellanmjölk
Mellanmjölk
Mellanmjölk
Mellanmjölk


SINCE 1901
LURPAK®
DANSK SMØR
SALTET
250g e

How do we know what to do?

Evidence trajectories



National Obesity Observatory

NHS

Standard Evaluation Framework

for weight management interventions

APH

Learn from success

Celebrate failure

Complicated v Complex Systems

$$\Longrightarrow dm \cdot \frac{1}{-u_e(1-\frac{v^2}{c^2})} = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv$$

$$\Longrightarrow d\left(\frac{m_e}{\sqrt{1-\frac{v^2}{c^2}}}\right)\cdot\left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{m_e}\right) = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv, \text{ substituting from earlier above relations}$$

$$\Longrightarrow d\left(m_e\left[1-\frac{v^2}{c^2}\right]^{-\frac{1}{2}}\right)\cdot\left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{m_e}\right) = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv$$

$$\Longrightarrow \left(dm_e\left[1-\frac{v^2}{c^2}\right]^{-\frac{1}{2}} + m_e d\left[1-\frac{v^2}{c^2}\right]^{-\frac{1}{2}}\right)\cdot\left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{m_e}\right) = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv$$

$$\Longrightarrow \left(dm_e\left[1-\frac{v^2}{c^2}\right]^{-\frac{1}{2}} - \frac{1}{2}m_e\left[1-\frac{v^2}{c^2}\right]^{-\frac{3}{2}}\cdot d\left[1-\frac{v^2}{c^2}\right]\right)\cdot\left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{m_e}\right) = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv$$

$$\Longrightarrow \left(dm_e\left[1-\frac{v^2}{c^2}\right]^{-\frac{1}{2}} - \frac{1}{2}m_e\left[1-\frac{v^2}{c^2}\right]^{-\frac{3}{2}}\cdot\left[0-2\frac{v}{c^2}dv\right]\right)\cdot\left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{m_e}\right) = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv$$

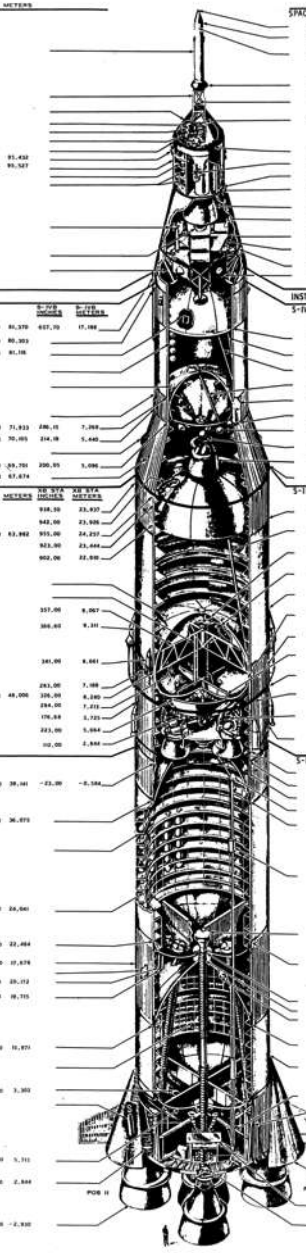
$$\Longrightarrow \left(dm_e\left[1-\frac{v^2}{c^2}\right]^{-\frac{1}{2}} + m_e\frac{v}{c^2}\left[1-\frac{v^2}{c^2}\right]^{-\frac{3}{2}}dv\right)\cdot\left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{m_e}\right) = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv$$

$$\Longrightarrow \frac{dm}{m} = \left(\frac{dm_e}{\sqrt{1-\frac{v^2}{c^2}}} + \frac{m_e(v/c^2)}{(1-\frac{v^2}{c^2})^{\frac{3}{2}}}dv\right)\cdot\left(\frac{\sqrt{1-\frac{v^2}{c^2}}}{m_e}\right) = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv$$

$$= \left(\frac{dm_e}{m_e} + \frac{v/c^2}{(1-v^2/c^2)}dv\right) = \frac{1-vu_e/c^2}{-u_e(1-\frac{v^2}{c^2})}dv$$

$$-\left(\frac{dm_e}{} + \frac{v/c^2}{}dv\cdot\frac{u_e}{}\right) - \frac{1-vu_e/c^2}{}dv, \text{ multiplying by unity } \frac{u_e}{}$$

SATURN V APOLLO FLIGHT CONFIGURATION



VEHICLE STATION (IN)	INCHES	METERS
SPACECRAFT (NORTH AMERICAN AVIATION)		
LES JETTISON MOTOR & LAUNCH ESCAPE SYSTEM		
LAUNCH ESCAPE TOWER		
COMMAND MODULE		
COMMAND PILOT		
SENIOR PILOT		
PILOT		
SERVICE MODULE		
CARRY ON UMBILICAL	3727.17	94.632
FLY AWAY UMBILICAL	3760.92	95.527
FUEL SUMP TANK		
H_2 CRYOGENIC STORAGE TANK		
RCS THRUSTER ASSEMBLY 4 PLACES		
LEM UPPER DOCKING TUNNEL		
LEM LANDING GEAR 4 PLACES		
INSTRUMENT UNIT (IBM)		
S-IVB (DOUGLAS)	S-IVB INCHES	S-IVB METERS
LH_2 TANK VENT	3203.36	81.370	657.70	17.188
ACCESS PLATFORM SUPPORT FITTING	3161.36	80.303		
ANTENNAS CENTERLINE	3093.36	81.118		
COLD HELIUM SPHERES (8)				
LOX TANK				
LINE FAIRING LH_2 FILL & DRAIN				
TOP OF AFT SKIRT	2832.06	71.933	280.10	7.368
LOX LH_2 FILL AND DRAIN	2760.02	70.105	214.18	5.440
RETRO ROCKET (4 PLACES)				
BOTTOM OF AFT SKIRT	2748.30	69.781	200.95	5.096
ACCESS PLATFORM SUPPORT FITTING	2864.13	67.674		
S-II (NORTH AMERICAN AVIATION)	INCHES	METERS	AB STA INCHES	AB STA METERS
SYSTEMS TUNNEL			918.50	23.327
LH_2 VENT			942.00	23.926
S-II TOP FORWARD SKIRT	2519.00	63.982	955.00	24.257
RADIO COMMAND ANTENNA 4 PLACES			923.50	23.444
TELEMETRY ANTENNA 4 PLACES			902.00	22.910
LOX TANK				
LOX PROPELLANT MANAGEMENT PROBE				
RING SLOSH BAFFLE			357.00	9.067
LH_2 RECIRCULATION SYSTEM 5 PLACES			306.60	9.311
LH_2 FILL & DRAIN			341.00	8.661
DIVISION OF AFT SKIRT			261.00	7.188
TOP OF AFT SKIRT	1880.00	48.006	236.00	6.240
BOTTOM OF SLOSH BAFFLE			284.00	7.213
TOP ULLAGE ROCKET FAIRING MOTOR			176.68	3.725
TOP OF THRUST CONE			223.00	5.664
BOTTOM OF THRUST CONE			112.00	2.844
S-IC (BOEING)				
TOP FORWARD SKIRT	1541.00	38.161	-23.00	-0.584
LOWER SECTION OF FORWARD SKIRT	1420.38	36.075		
RING SLOSH BAFFLES				
LOWER SECTION OF HELIUM BOTTLES (6)	848.38	26.061		
TOP OF INTERTANK ASSEMBLY	883.20	22.484		
FUEL VENT LINE	698.00	17.678		
ACCESS DOOR (FAR SIDE)				
LOX FILL & DRAIN (FAR SIDE)	784.18	20.112		
LOX FILL & DRAIN (FAR SIDE)	776.18	19.715		
BOTTOM OF INTERTANK ASSEMBLY	628.80	11.871		
SLOSH BAFFLES				
FUEL FILL & DRAIN	120.00	3.302		
RETRO ROCKETS (2 EACH 4 PLACES)				
BOTTOM OF FUEL TANK	221.00	5.711		
TOP OF HEAT SHIELD	112.00	2.844		
BOTTOM OF F-1 ENGINE	-117.35	-2.930		

VEHICLE STATIONS (IN)	INCHES	METERS
SPACECRAFT		
VEHICLE STATION	4240.79	107.718
BASE OF CONARD NOSE CONE	4093.73	106.774
CENTERLINE LAUNCH ESCAPE MOTOR	4101.53	108.112
BOTTOM OF LES SKIRT	3903.03	100.101
TOP OF BOOST COVER	3890.03	98.527
VEHICLE SEPARATION	3848.93	97.529
AFT HEAT SHIELD	3749.56	95.239
REACTION CONTROL SYSTEM MODULE	3711.43	94.272
VEHICLE STATION FLIGHT SEPARATION	3584.55	91.301
VEHICLE SEPARATION	3583.50	91.275
PROPULSION MOTOR		
RENDEZVOUS RADAR ANTENNA		
LUNAR EXCURSION MODULE		
LEM FORWARD DOCKING TUNNEL		
VEHICLE SEPARATION	3240.05	84.837
VEHICLE STATION	3285.18	83.443
INSTRUMENT UNIT INSTRUMENT UNIT TOP	3258.56	82.767
INSTRUMENT UNIT BOTTOM	3222.56	81.853
S-IVB	S-IVB INCHES	S-IVB METERS
TOP FORWARD SKIRT	678.70	17.238
BOTTOM OF FORWARD SKIRT	2800.36	78.754	554.70	14.088
FUEL MASS SENSOR PROBE				
INSTRUMENTATION PROBE				
LOX TANK PROBE				
AUXILIARY PROPULSION SYSTEM (APS) (2)				
LOX VENT (FAR SIDE)	2759.00	70.078	513.10	13.414
HELIUM SPHERES (8 PLACES)				
TOP J-2 ENGINE	2645.65	67.204	100.00	2.540
J-2 ENGINE				
BOTTOM S-IVB TOP S-II	2518.00	63.958	-26.98	-.682
S-II	INCHES	METERS	AB STA INCHES	AB STA METERS
BOTTOM OF FORWARD SKIRT			822.00	20.904
LH_2 PROPELLANT MANAGEMENT PROBE				
PRESSURIZATION MAST				
LOX VENT LINE				
TOP OF LH_2 FEED FAIRING 5 PLACES			451.75	11.474
LOX TANK EQUATOR	1848	46.939		
LOX FILL & DRAIN (FAR SIDE)			207.00	5.257
CRUCIFORM BAFFLE			173.00	4.394
BOTTOM LH_2 FEED FAIRING			158.00	4.013
FLIGHT SEPARATION	3760.00	44.704	196.00	4.978
GIMBAL PLANE			100.00	2.540
BOTTOM ULLAGE R M FAIRING			-0.44	-.001
S-IC				
FLIGHT SEPARATION			0.00	0.000
S-II INTERSTAGE BOTTOM	1541.00	39.141	-23.00	-0.584
LOX VENT	1525.00	38.732		
OOX LINE	1511.75	38.398		
Y RING	1484.00	37.691		
PRESSURIZATION TUNNEL (2 PLACES)				
LOX FEED LINE TUNNEL (2 PLACES)				
Y RING	909.00	23.088		
BOTTOM OF LOX TANK	772.00	19.606		
TOP OF FUEL TANK	742.00	18.846		
FUEL PRESSURE LINE	682.50	17.336		
Y RING	605.00	15.367		
TOP OF ENGINE FAIRING	362.00	9.194		
TOP OF THRUST STRUCTURE	345.70	8.780		
INTERCONNECT LOX DRAIN	120.00	3.302		
BOTTOM OF ENGINE FAIRING	48.50	1.231		
POS III				
BOTTOM OF THRUST STRUCTURE	18.00	2.540		
GIMBAL	100.00	2.540		

ISOMETRIC SCALE

SHEET 1 OF 2
REF: IB6573 APOLLO SATURN AS-501

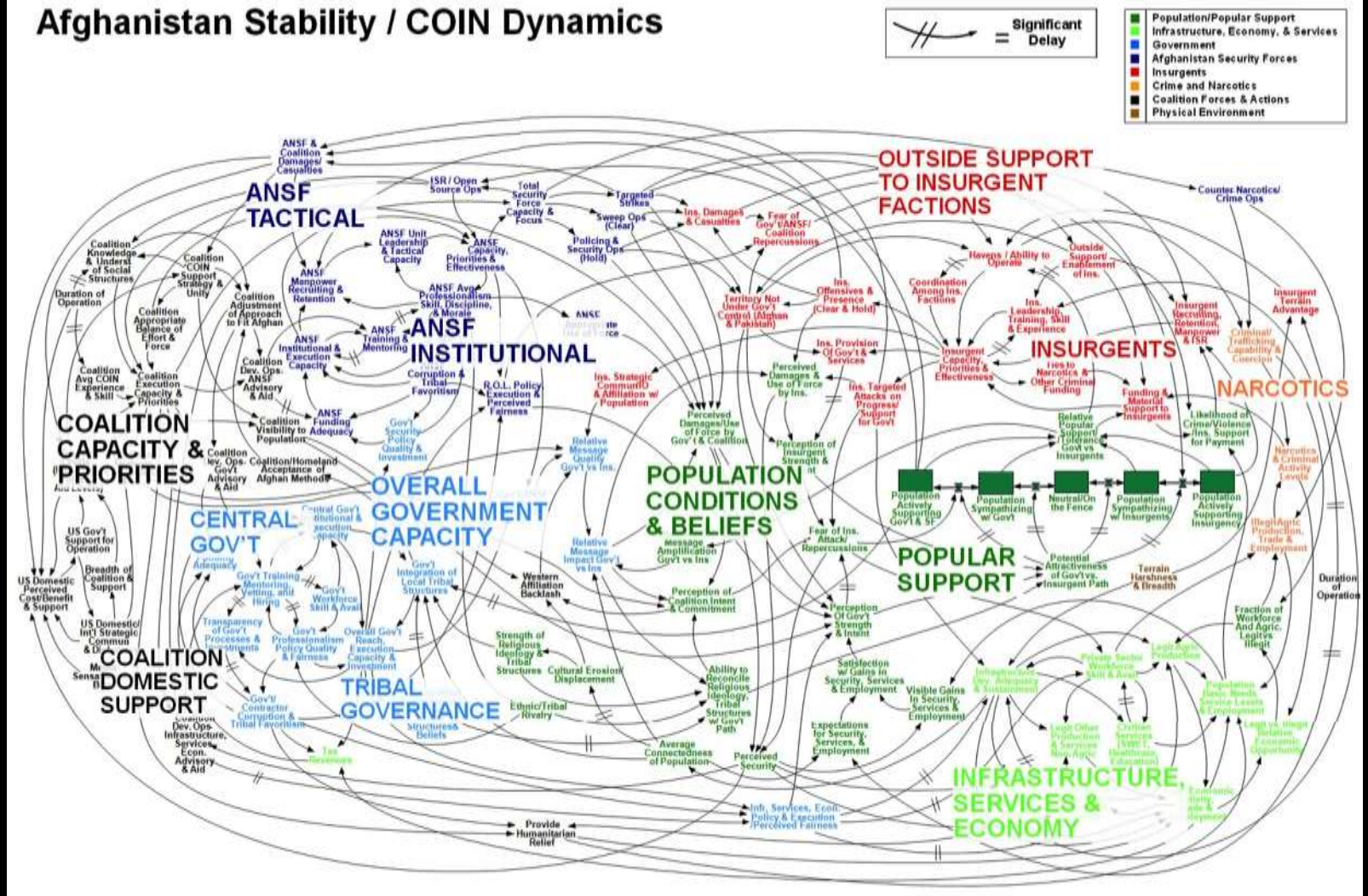
THE BOEING COMPANY
SPACE DIVISION, LAUNCH SYSTEMS BRANCH
HUNTSVILLE, ALA. 35807

SATURN V APOLLO
FLIGHT CONFIGURATION

DRAWING ORIGINATED BY: HUNTSVILLE ENGINEERING
DATE: 1 MARCH 1967
DRAWN BY: DON SPRAGUE

FOR ADDITIONAL COPIES PHONE:

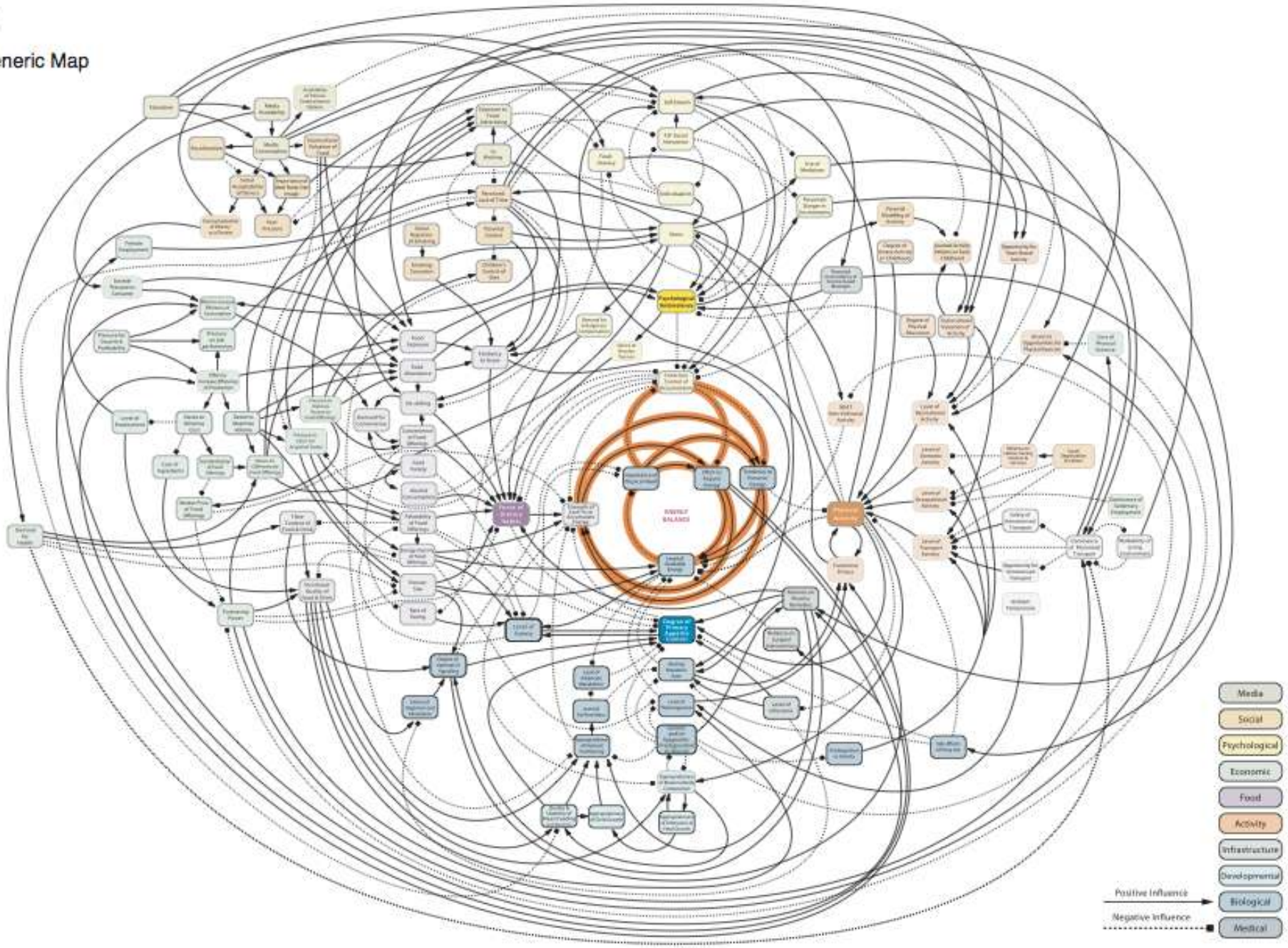
Afghanistan Stability / COIN Dynamics

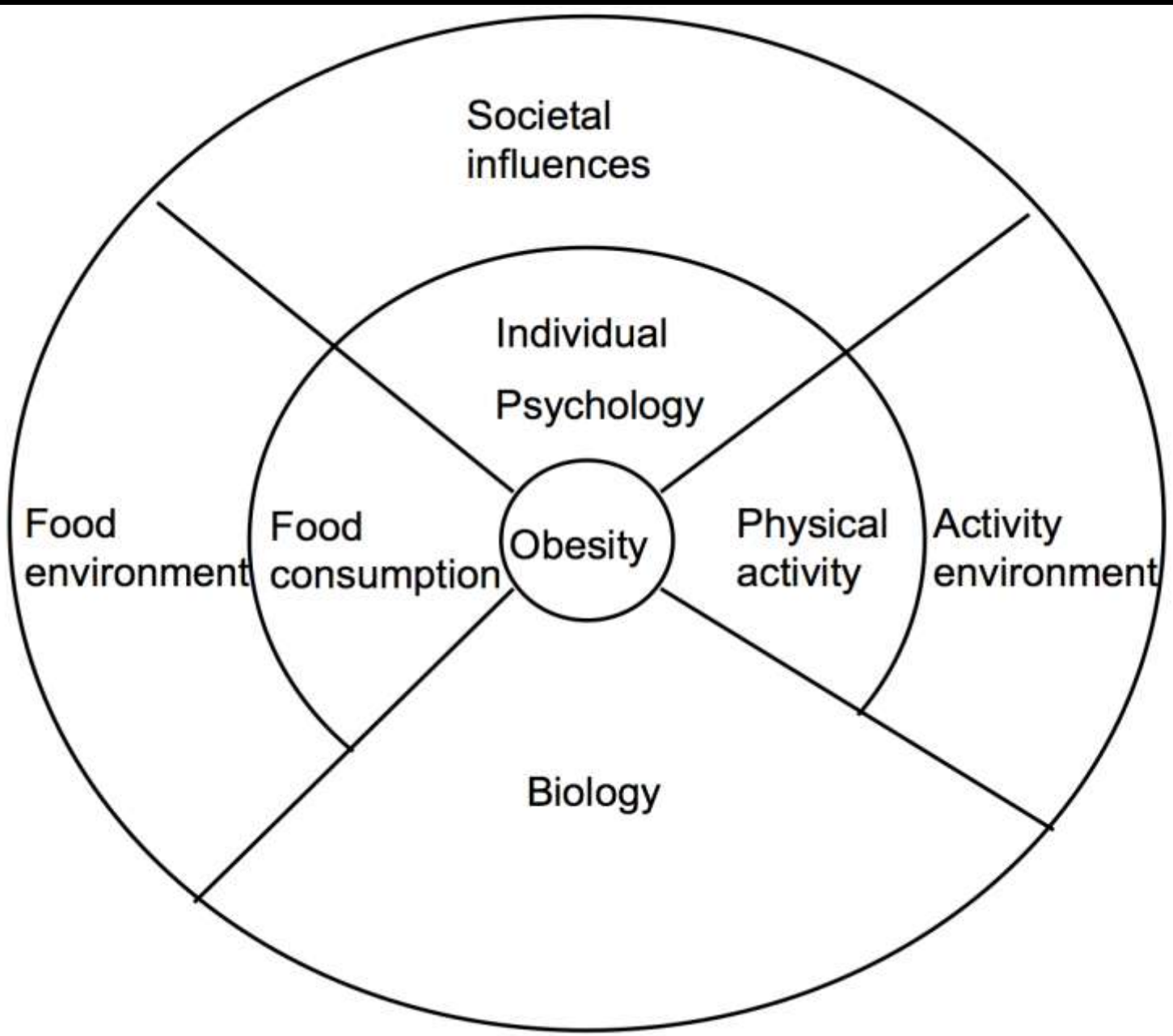


WORKING DRAFT – V3

Map 0

Full Generic Map



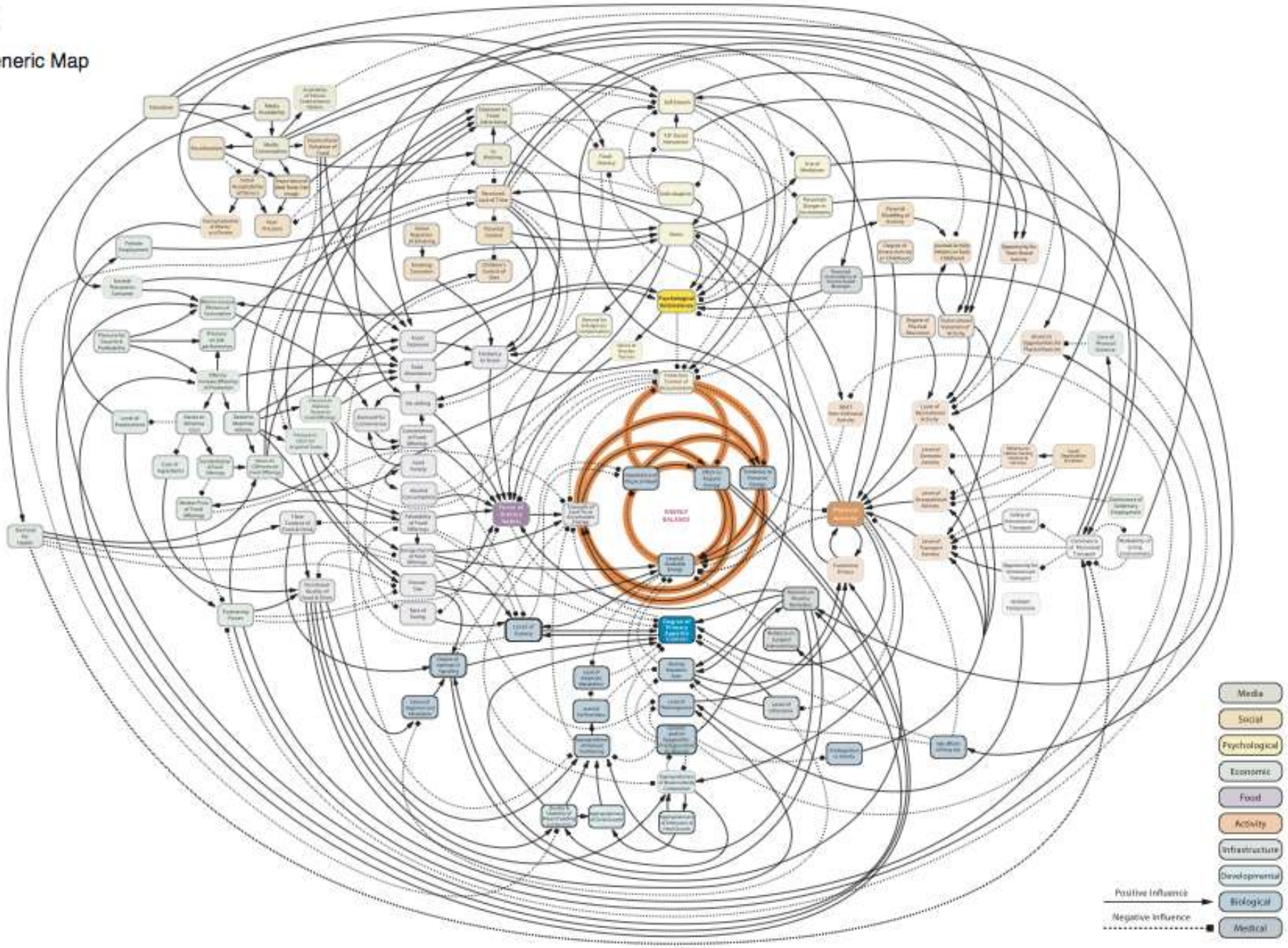


Source: 2007. Foresight Tackling Obesities : Future Choices — Obesity System Atlas

How do we know what works?

Map 0

Full Generic Map



Map 0

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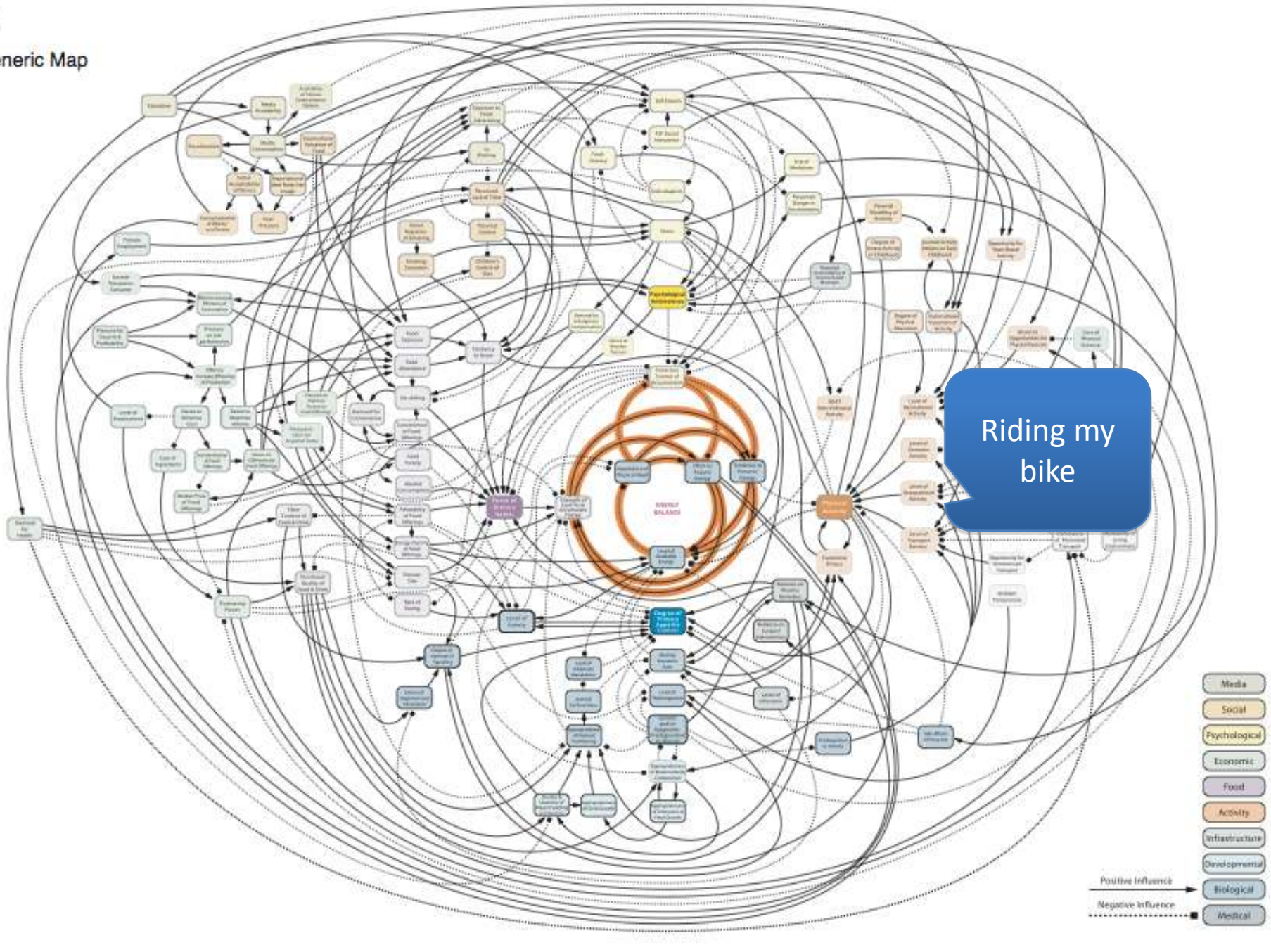

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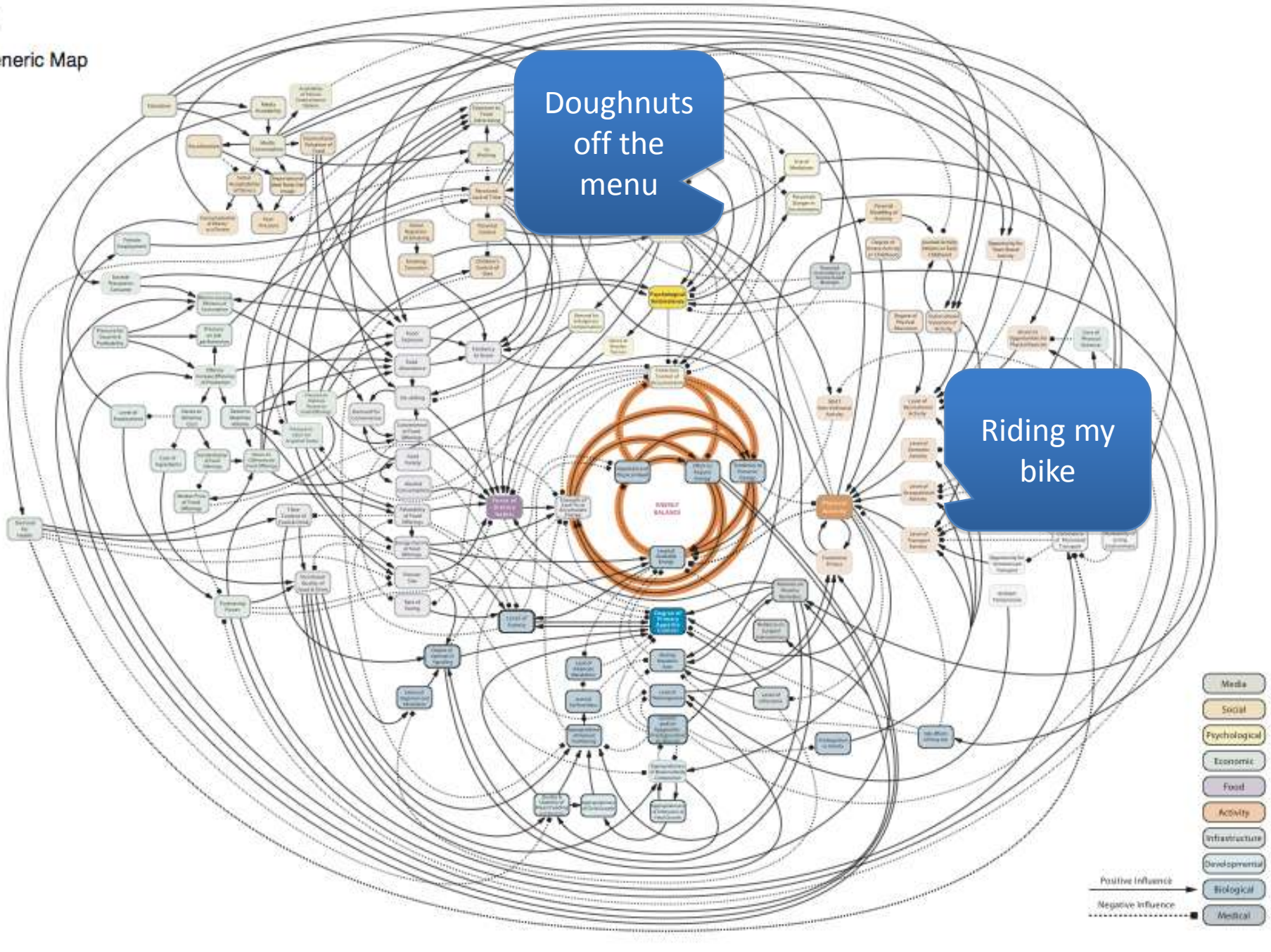

Map 0

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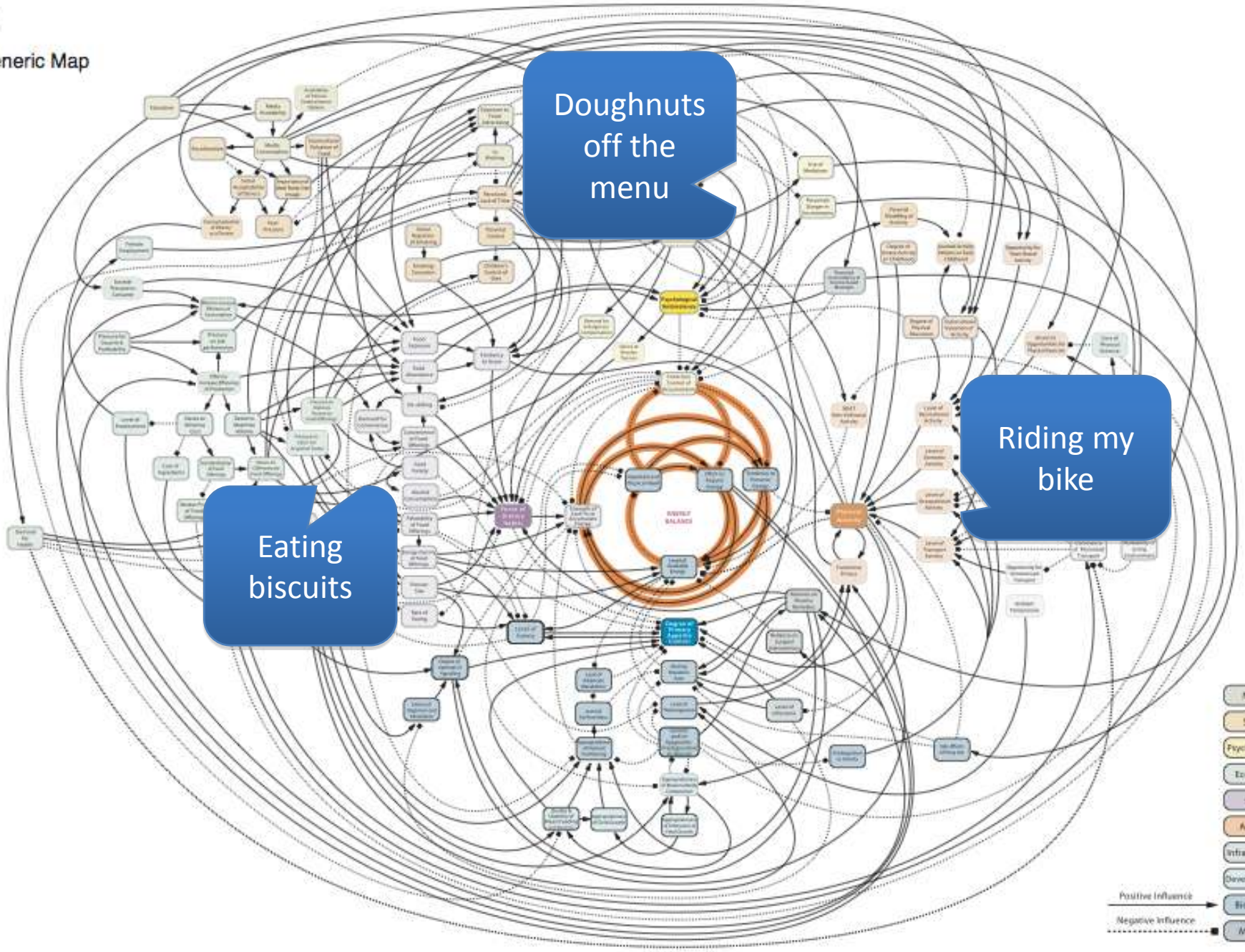

Map 0

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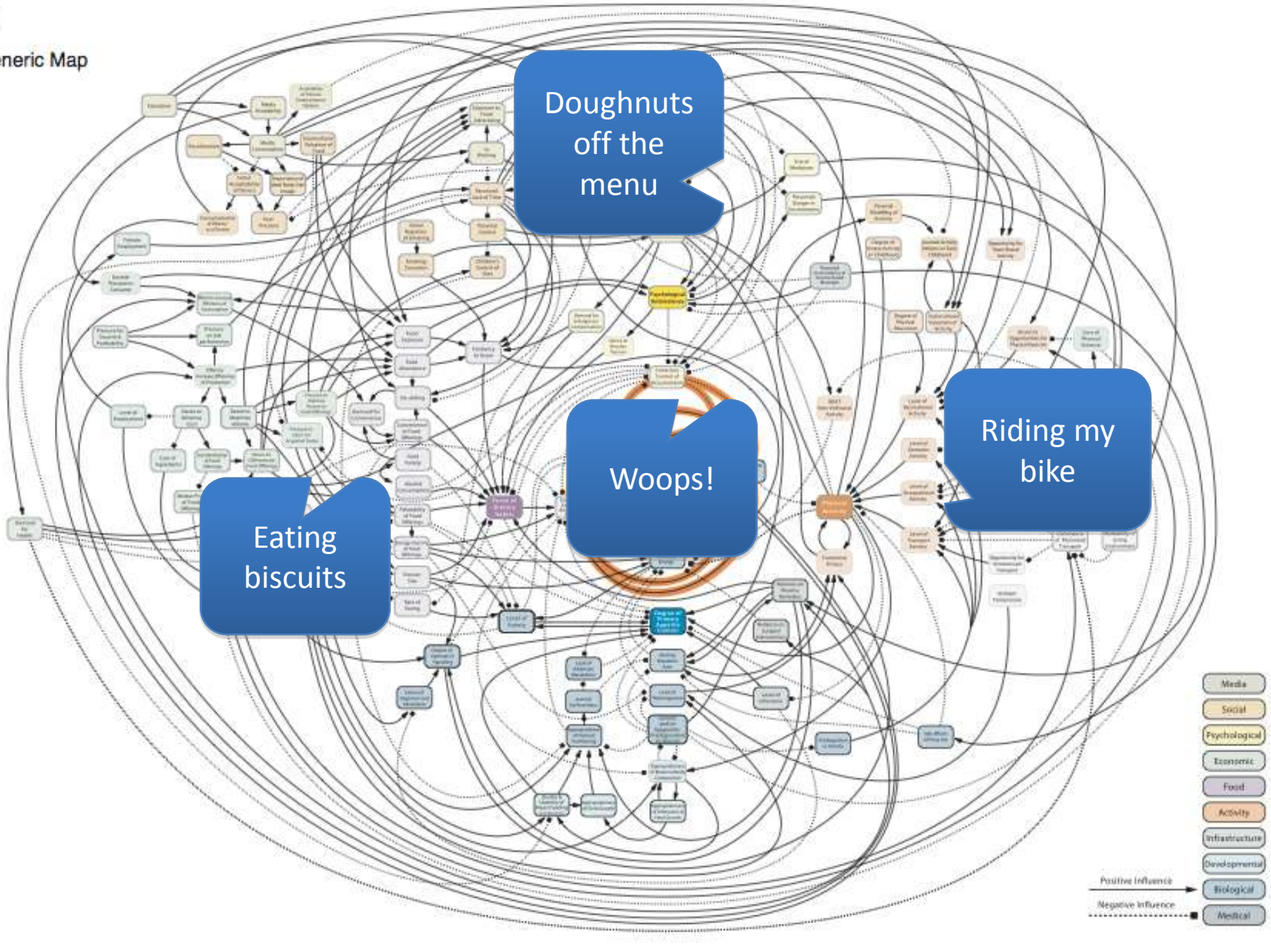
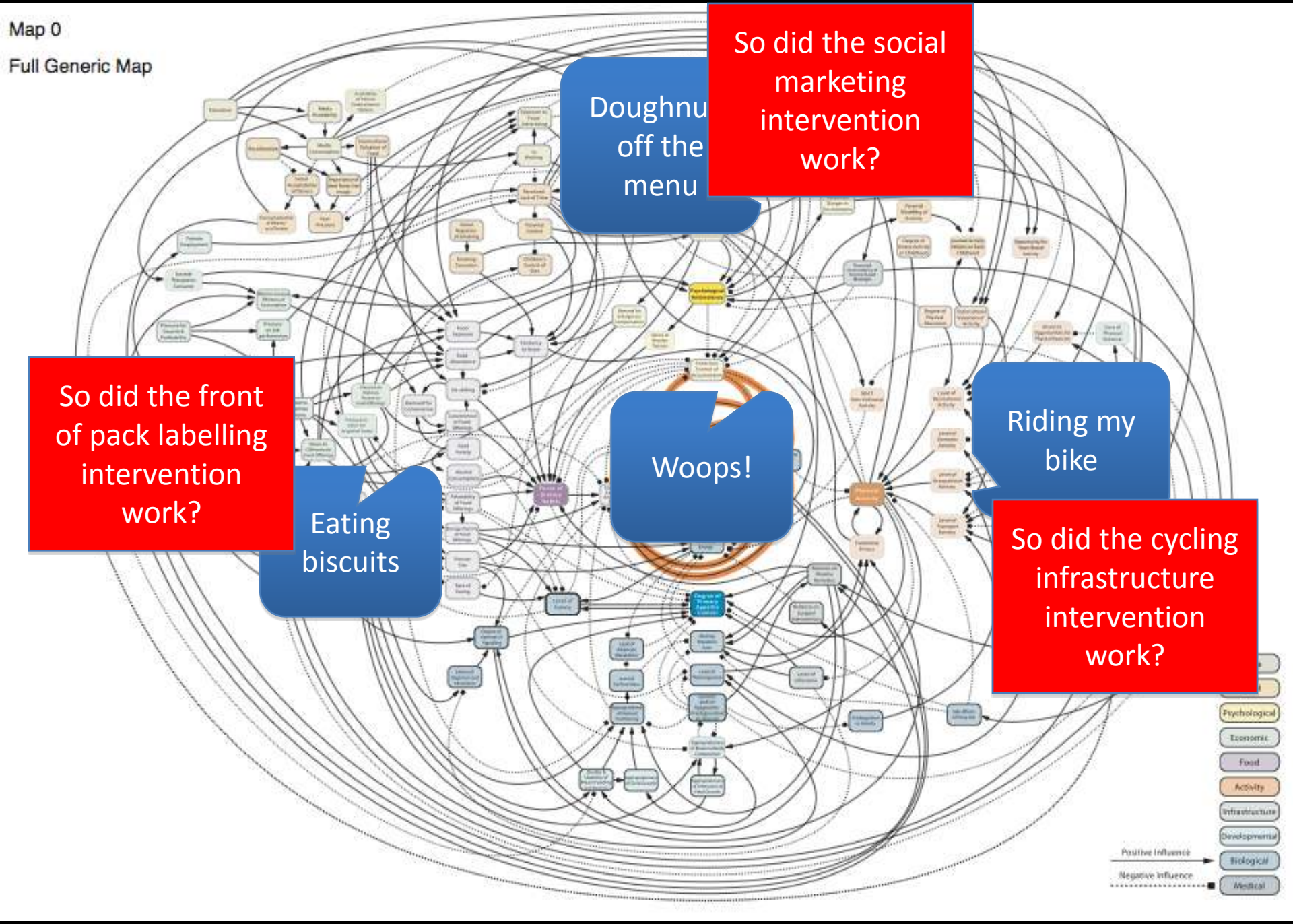
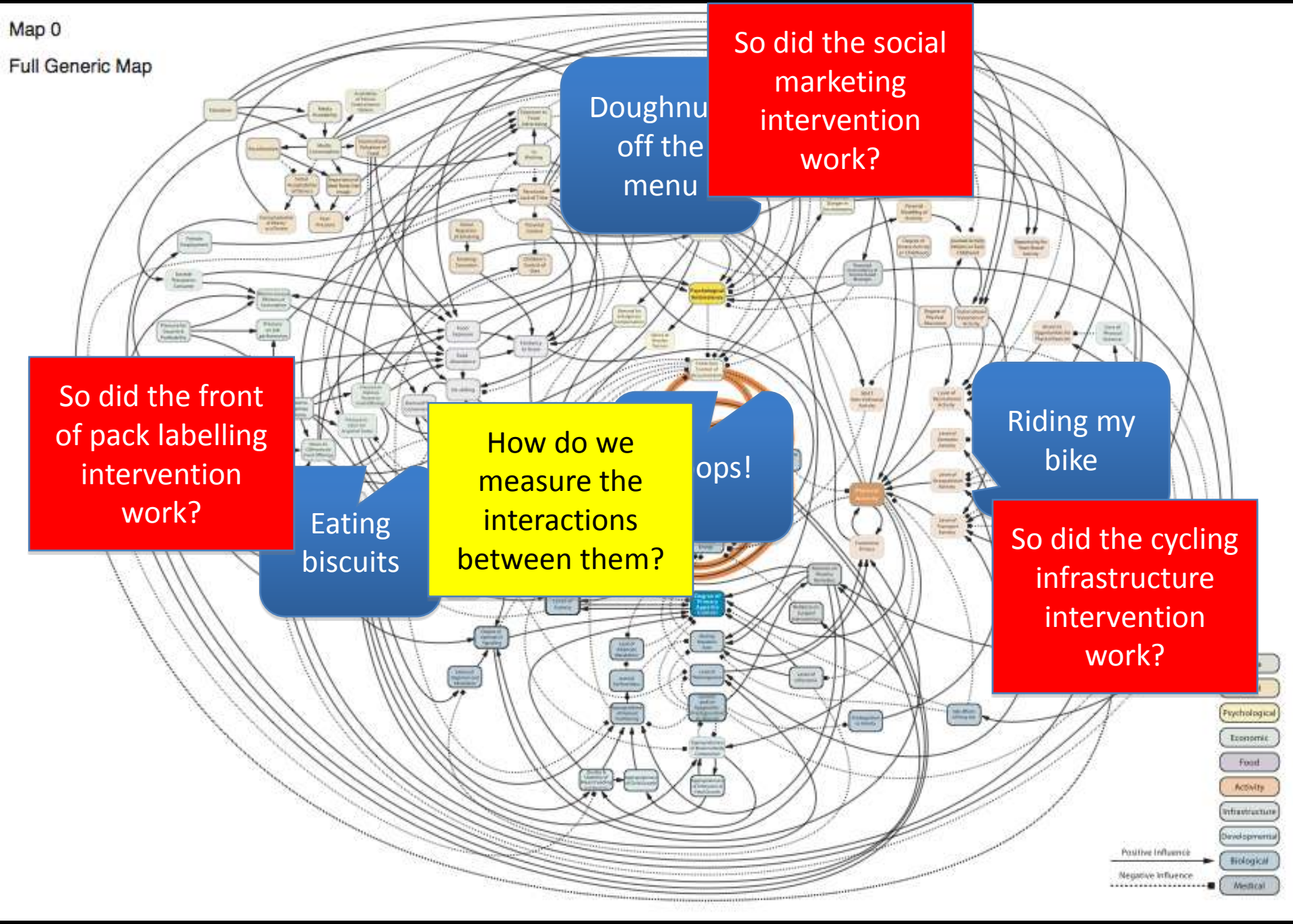
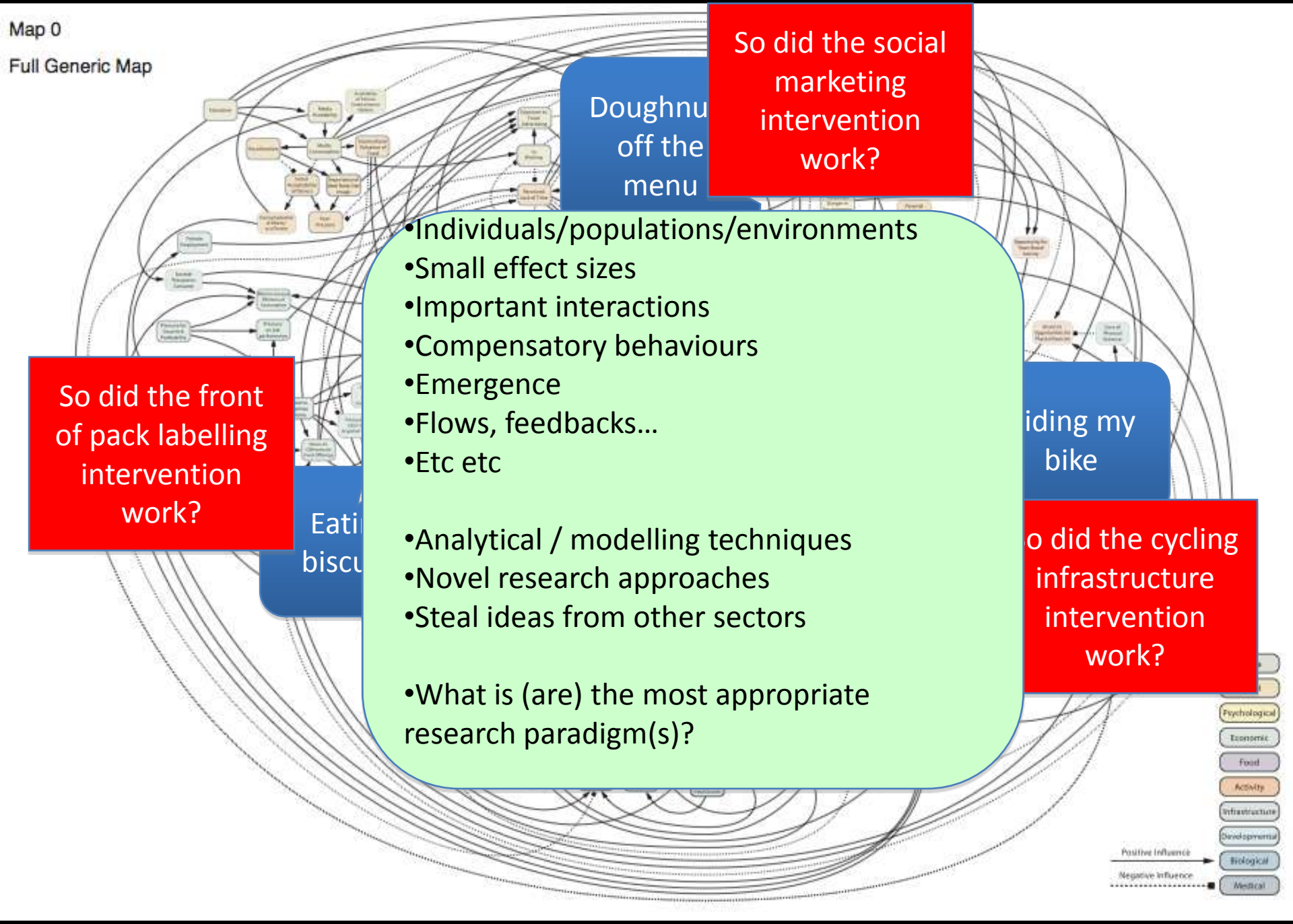


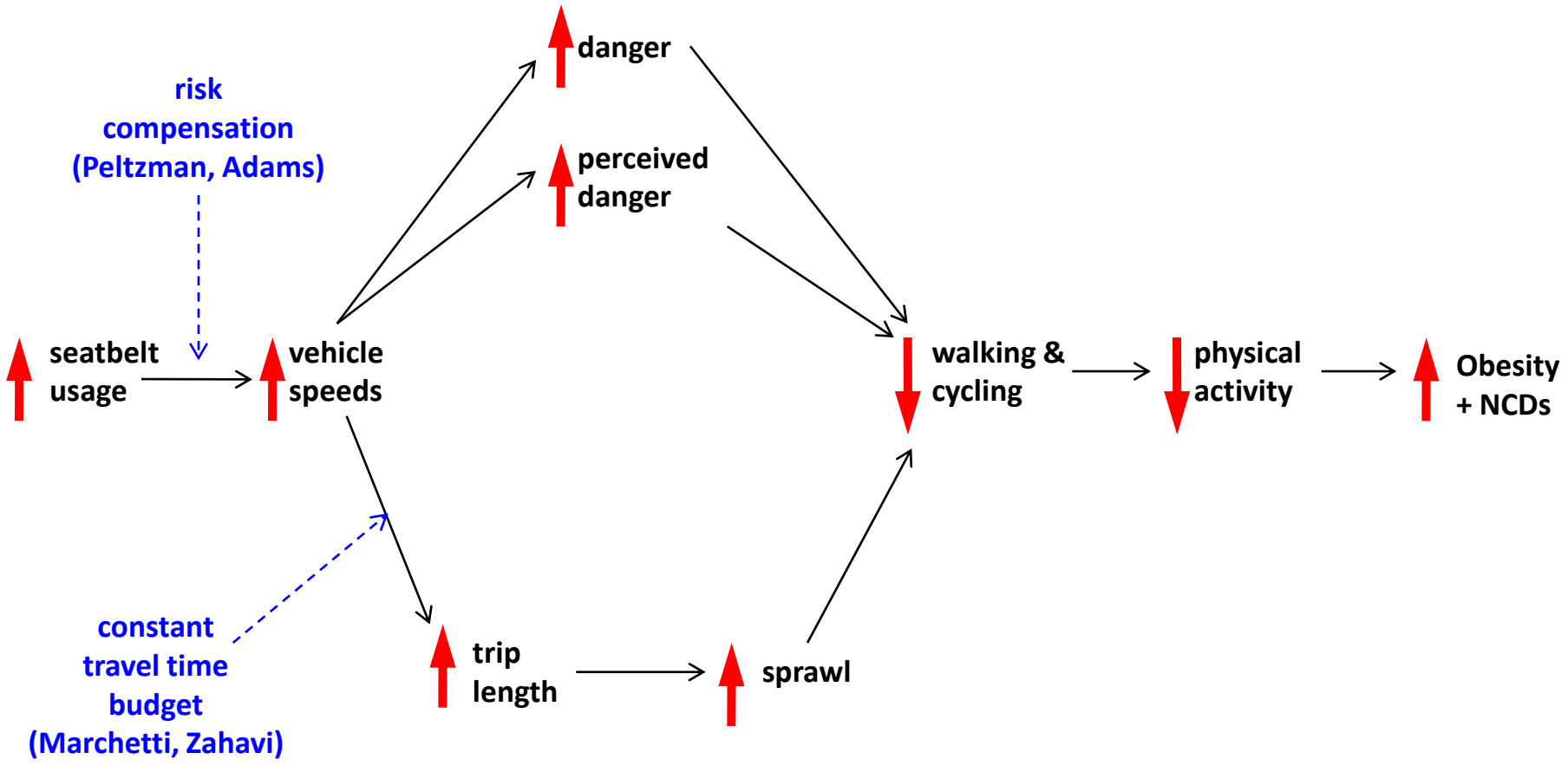

Map 0
Full Generic Map
Doughnu
off the
menu
So did the social marketing intervention work?
So did the front of pack labelling intervention work?
Eating biscuits
Woops!
Riding my bike
So did the cycling infrastructure intervention work?
Psychological
Economic
Food
Activity
Infrastructure
Developmental
Biological
Medical
Positive Influence
Negative Influence


Map 0
Full Generic Map
So did the social marketing intervention work?
Doughnu
off the
menu
So did the front of pack labelling intervention work?
How do we measure the interactions between them?
ops!
Riding my bike
Eating biscuits
So did the cycling infrastructure intervention work?
Psychological
Economic
Food
Activity
Infrastructure
Developmental
Biological
Medical
Positive Influence
Negative Influence

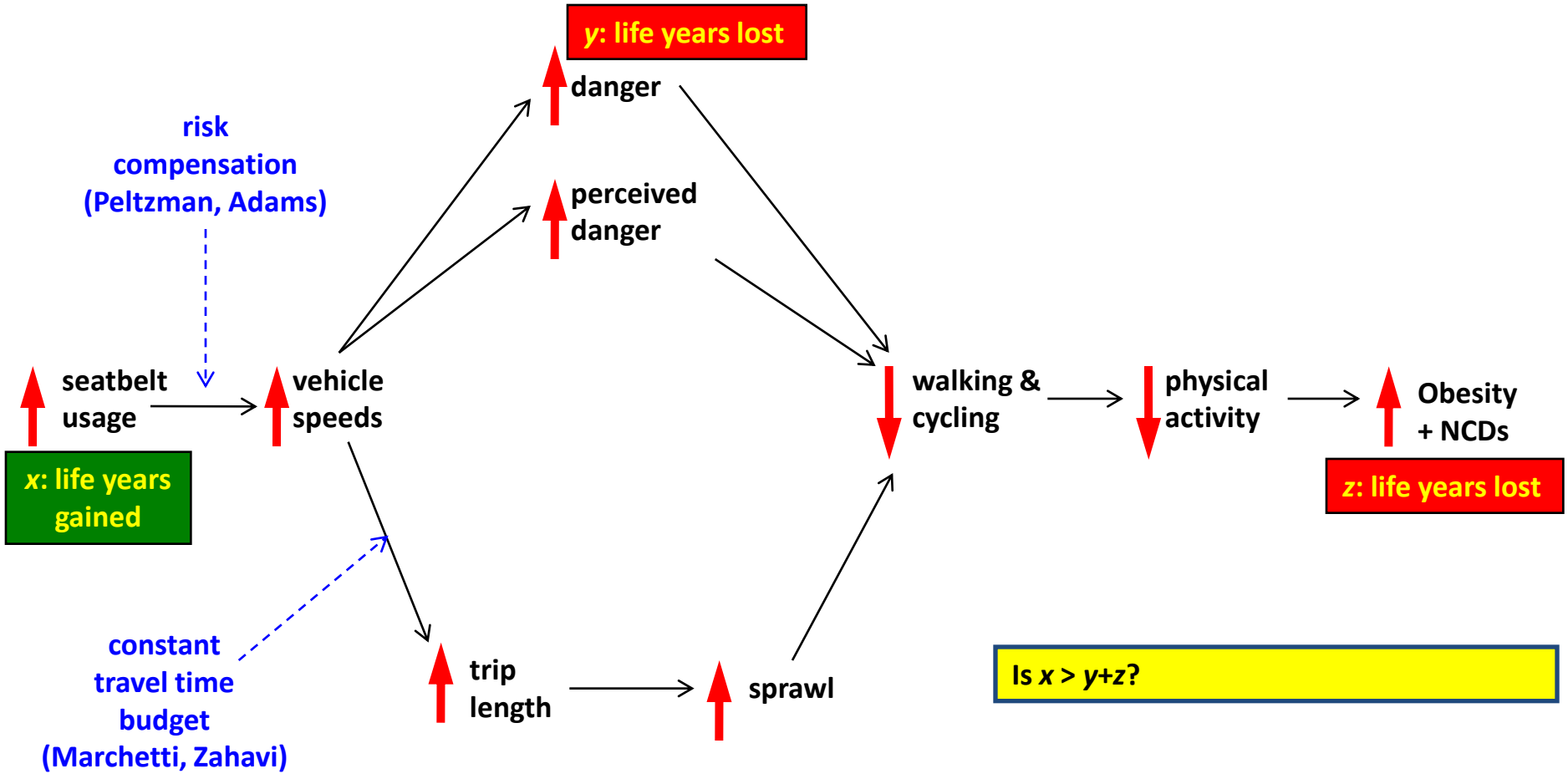

Map 0
Full Generic Map
So did the social marketing intervention work?
Doughnu
off the
menu
•Individuals/populations/environments
•Small effect sizes
•Important interactions
•Compensatory behaviours
•Emergence
•Flows, feedbacks…
•Etc etc
•Analytical / modelling techniques
•Novel research approaches
•Steal ideas from other sectors
•What is (are) the most appropriate research paradigm(s)?
So did the front of pack labelling intervention work?
iding my
bike
o did the cycling infrastructure intervention work?
Eati
biscu
Psychological
Economic
Food
Activity
Infrastructure
Developmental
Biological
Medical
Positive Influence
Negative Influence

What do we do about this?

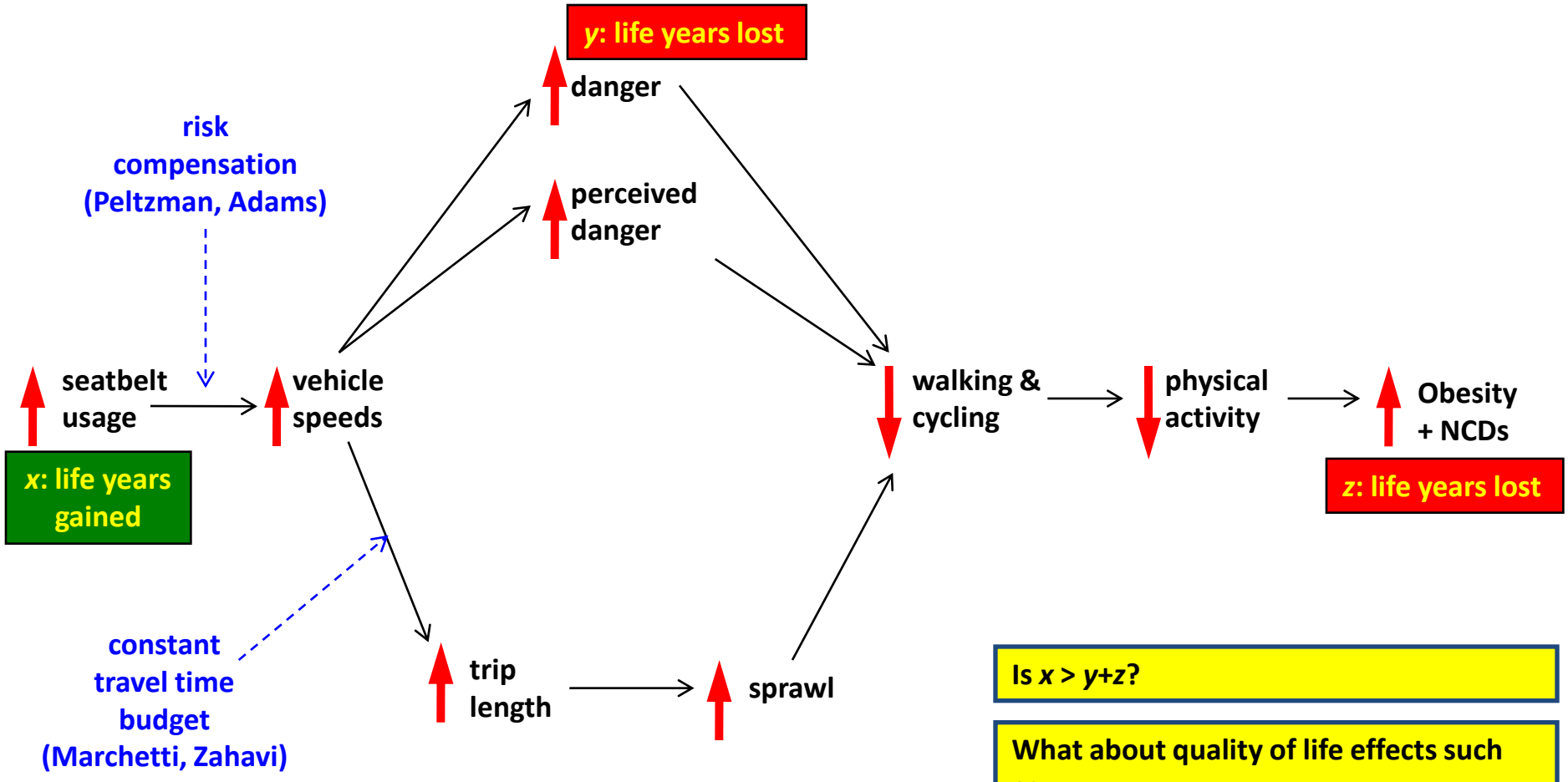
Do seatbelts promote obesity?



Do seatbelts promote obesity?



Do seatbelts promote obesity?



Is $x > y+z$?

What about quality of life effects such as:

- Happy petrolheads
- Frustrated cyclists
- Scared pedestrians

Places to Intervene in Complex Systems

1. Power to transcend paradigms
2. Paradigm that the system arises out of
3. Goals of the system
4. Power to add, change, evolve or self-organize system structure
5. Rules of the system
6. Structure of information flow
7. Gain around driving positive feedback loops
8. Strength of negative feedback loops
9. Length of delays
10. Structure of material stocks and flows
11. Size of buffers and other stabilizing stocks
12. Constants, parameters, numbers

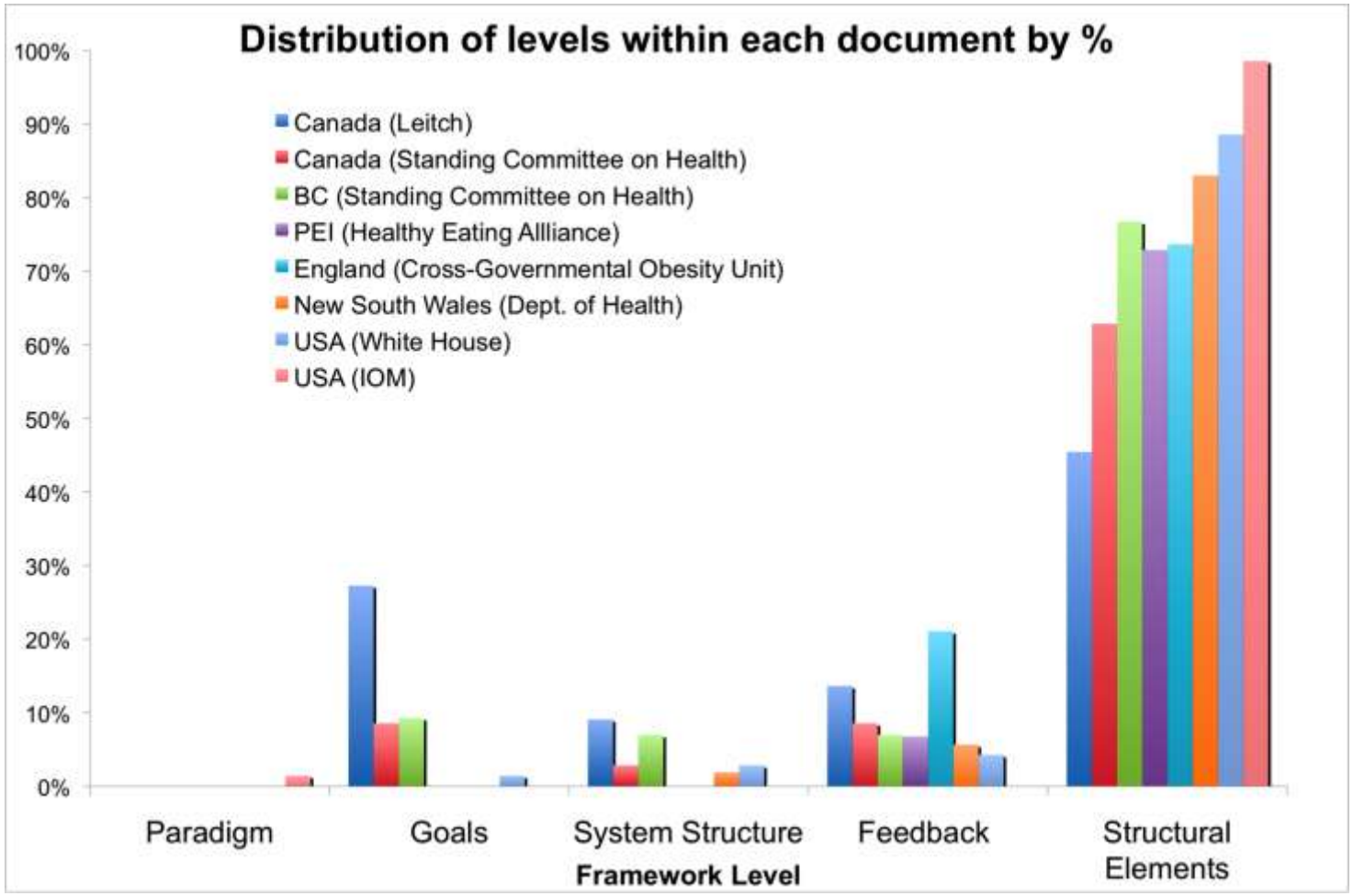
Source: Leverage Points: place to intervene in a system. Donella Meadows, The Sustainability Institute 1999

The Intervention Level Framework

Intervention Level	Definition
Paradigm	System's deepest held beliefs. System goals, rules and structure arise out of the paradigm.
Goals	The aim/priorities of the system.
System structure	All of the elements that make up the system as a whole including the subsystems, actors and interconnections between these elements.
Feedback & Delays	Loops that cause an action by one element of the system to in turn affect the flows into or out of that same element.
Structural elements	Subsystems, actors and the physical elements of the system.

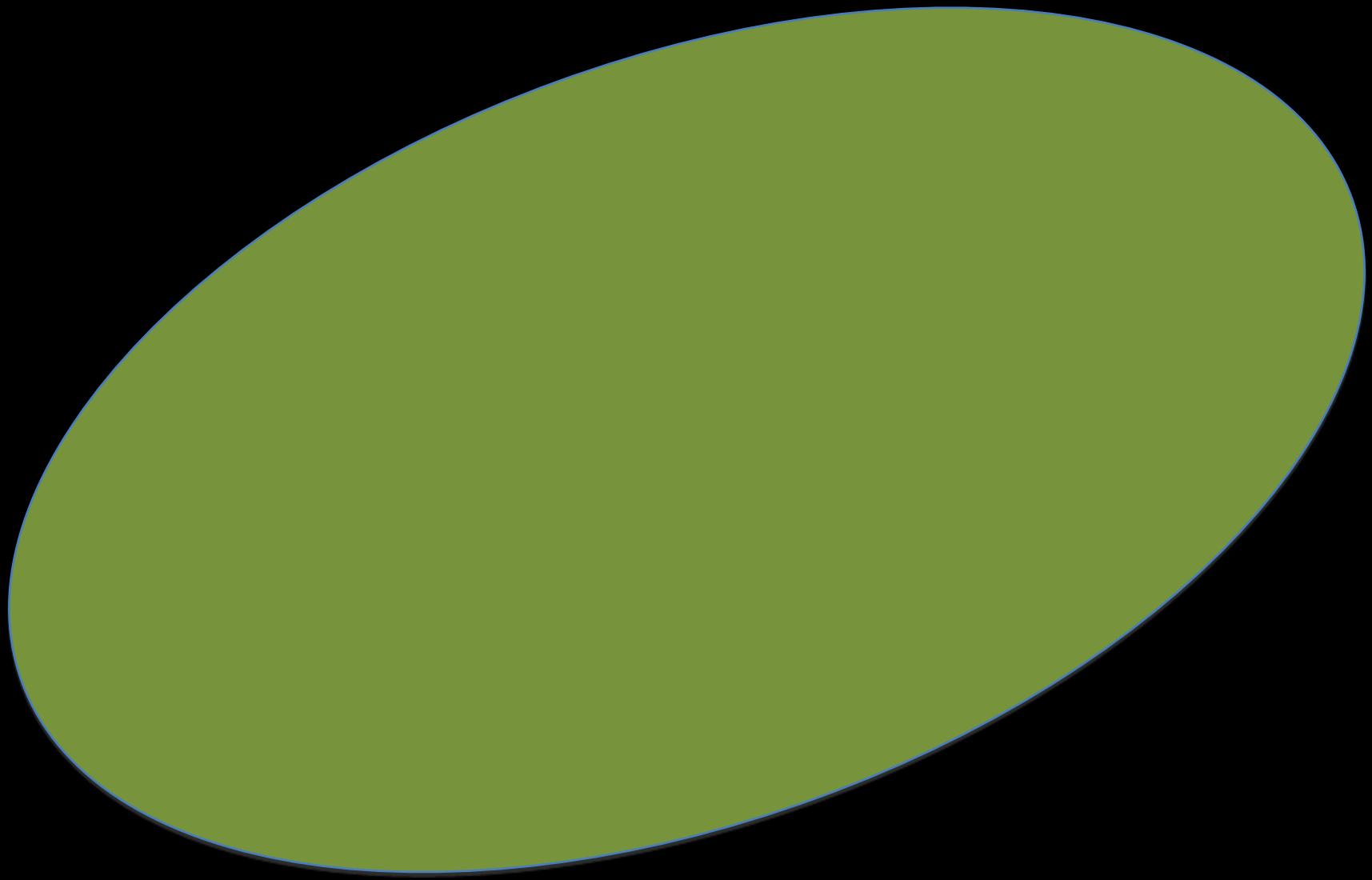
Source: Johnston, Matteson, Finegood, Simon Fraser University: personal communication

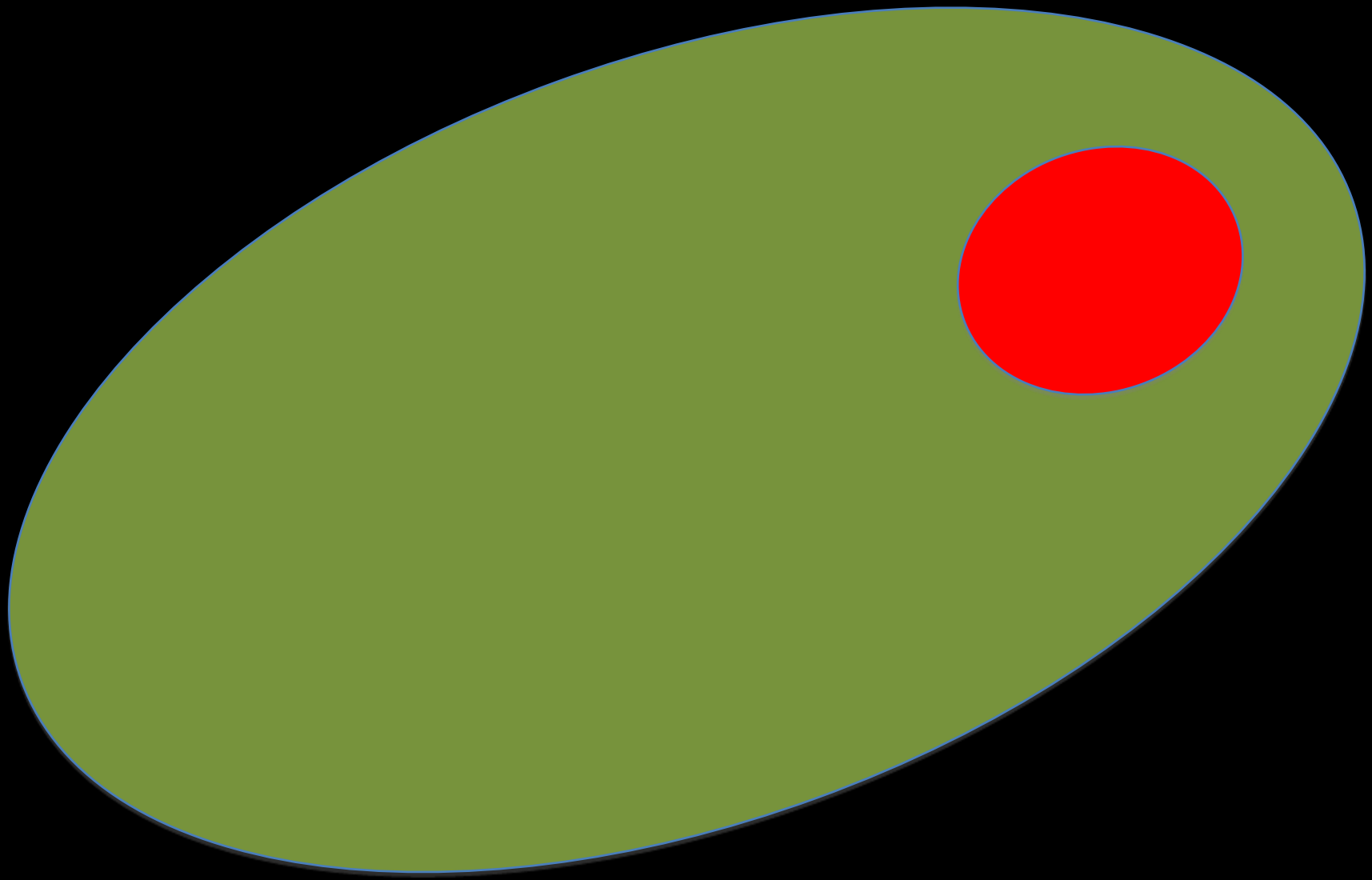
Obesity strategy analysis

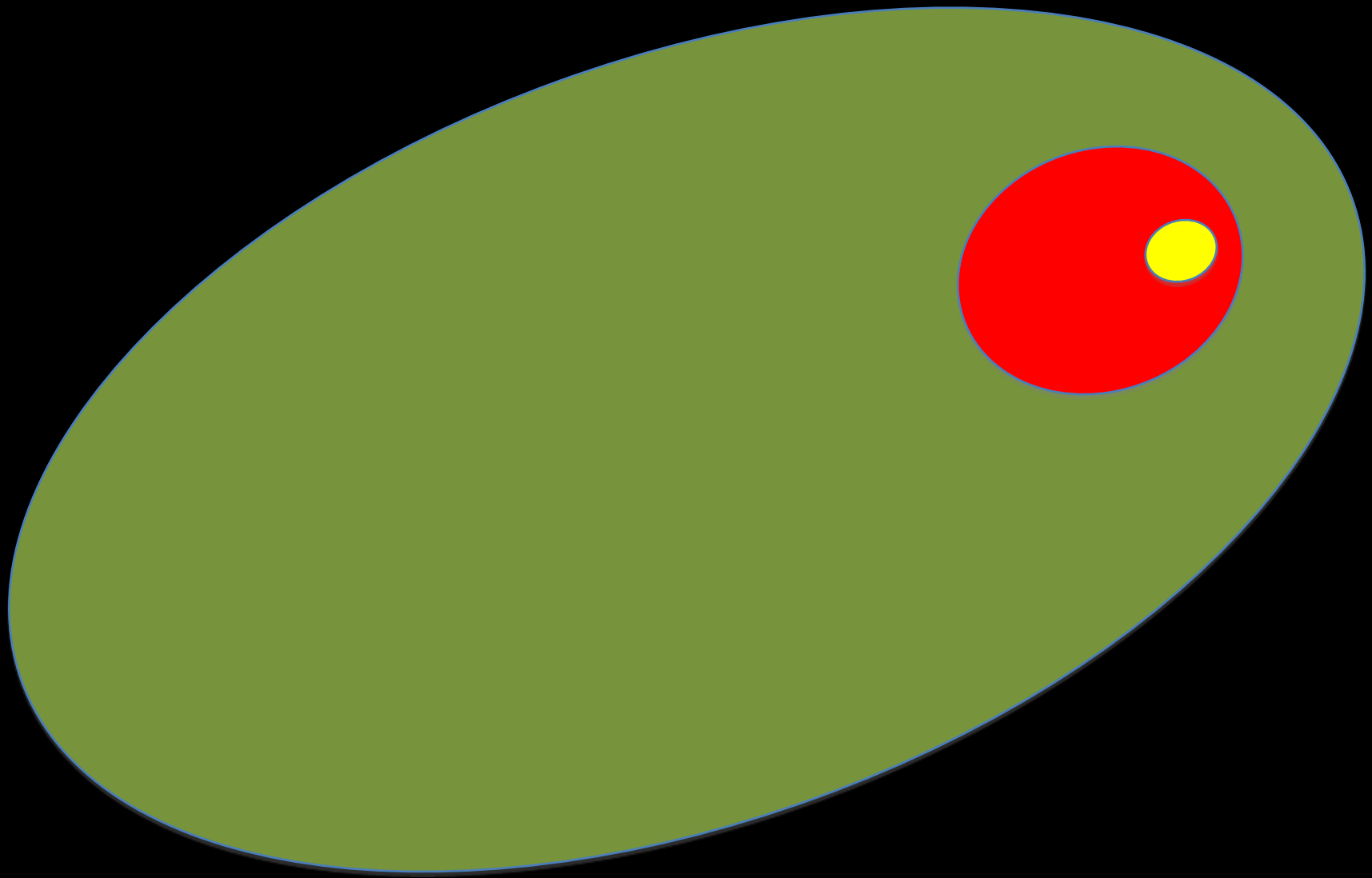


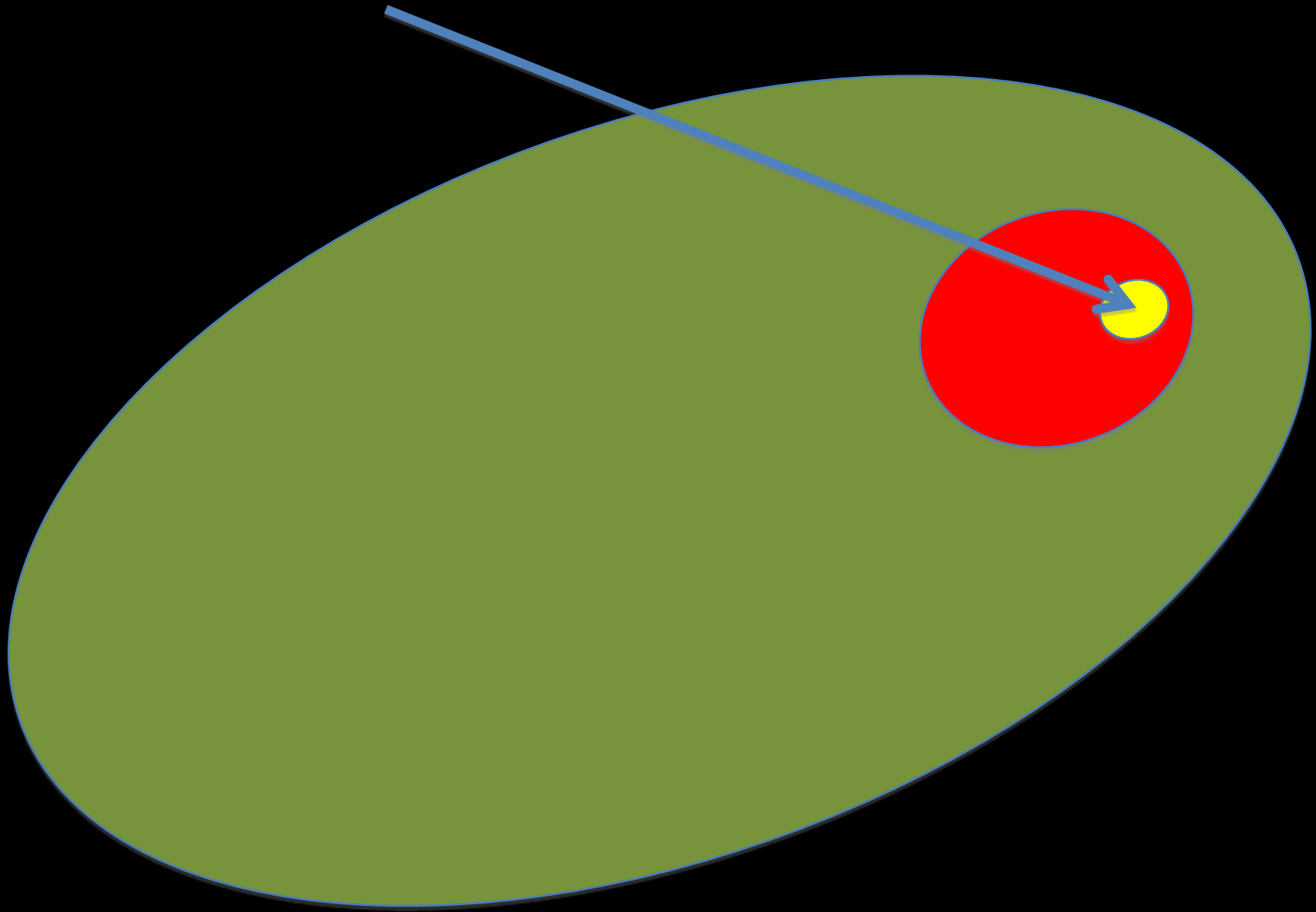
Source: Johnston, Matteson, Finegood, Simon Fraser University: personal communication

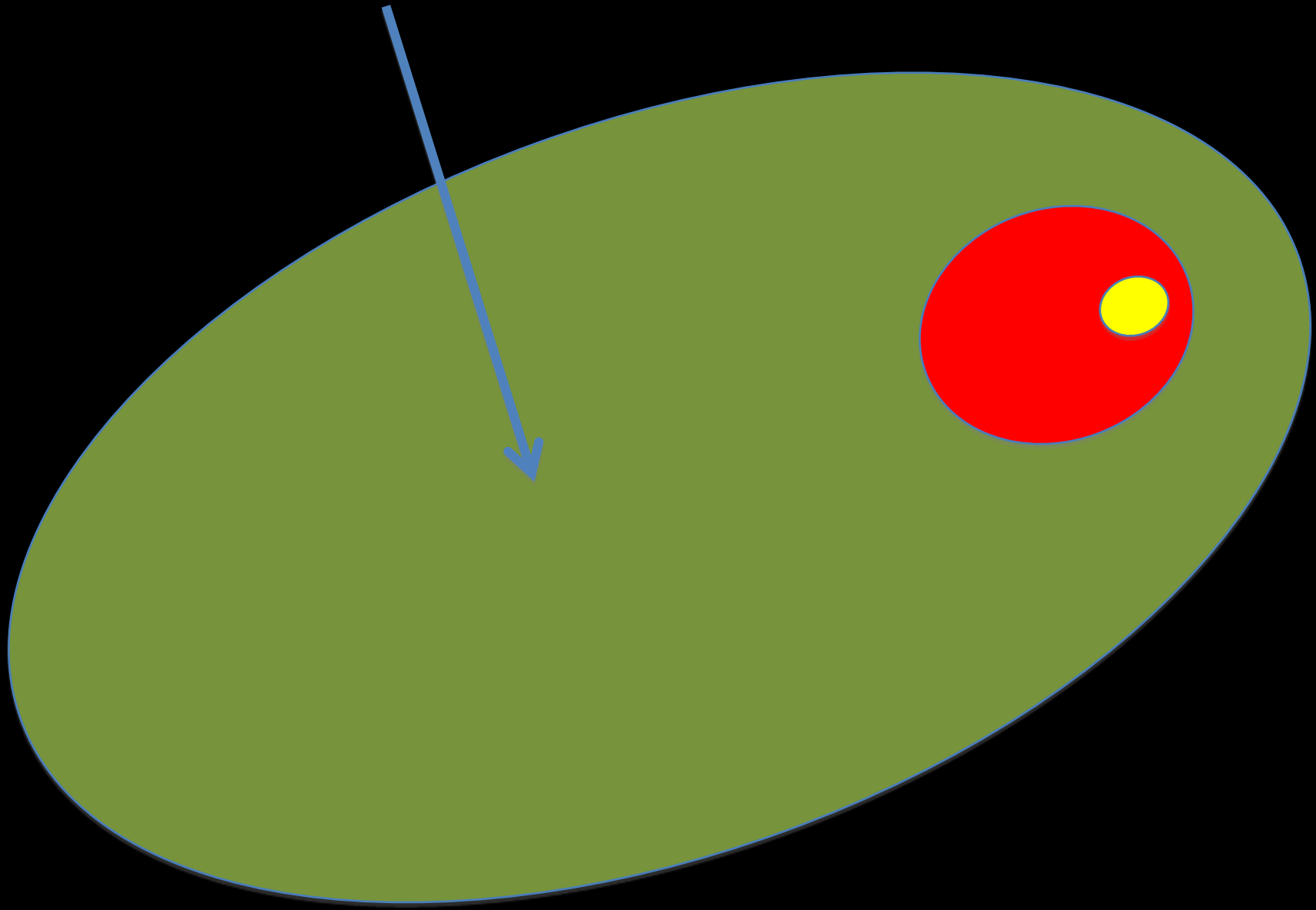
Cost-effectiveness



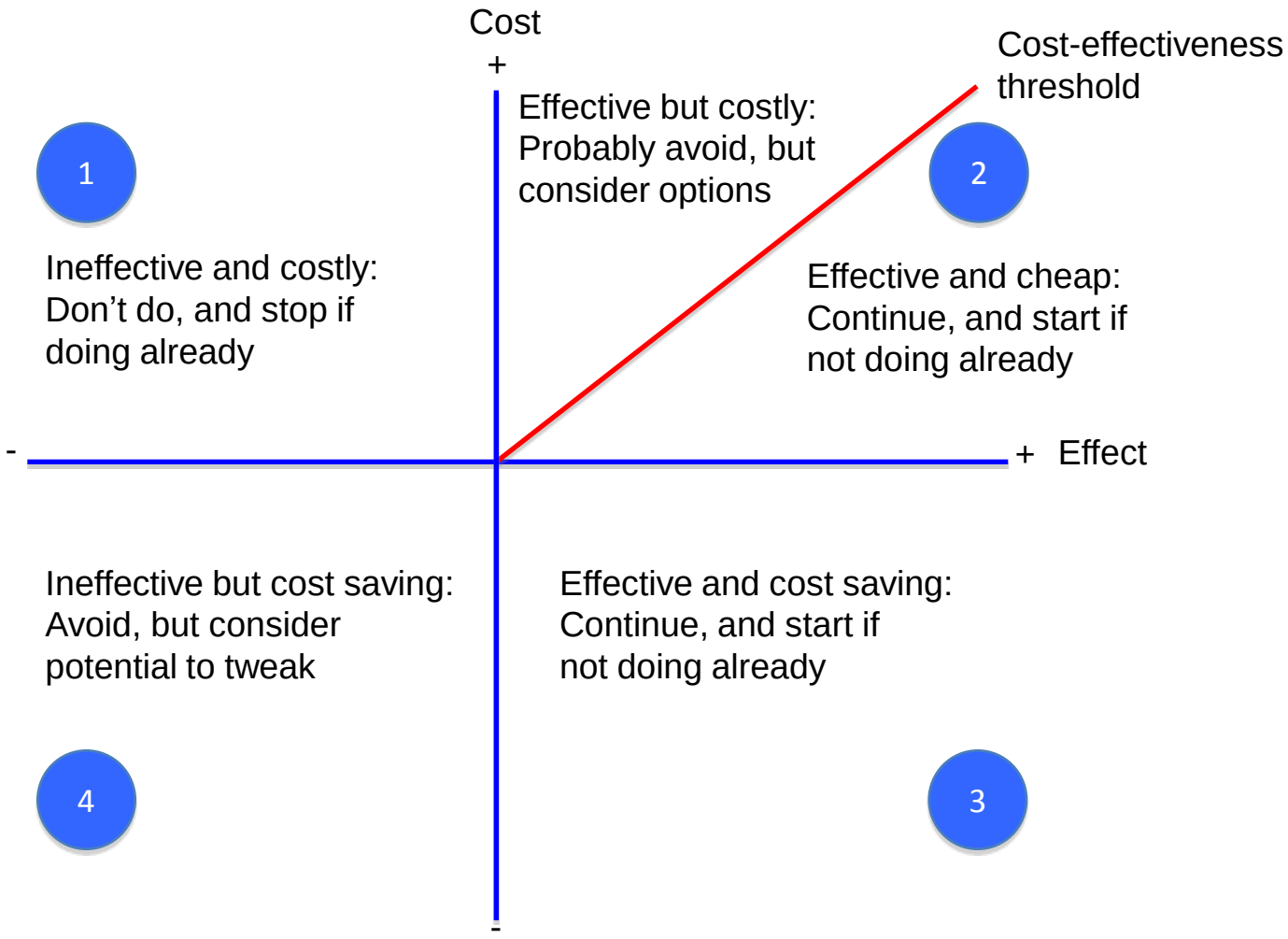








Cost effectiveness grid



Hedgehogs and foxes

Social silences

"... one of the things I learned as an anthropologist is that to understand how a society works you need not just to look at the areas of what we call 'social noise' - ie what everyone likes to talk about…you need to look at the social silences as well."

Gillian Tett: http://www.guardian.co.uk/business/2008/oct/31/creditcrunch-gillian-tett-financial-times

The real world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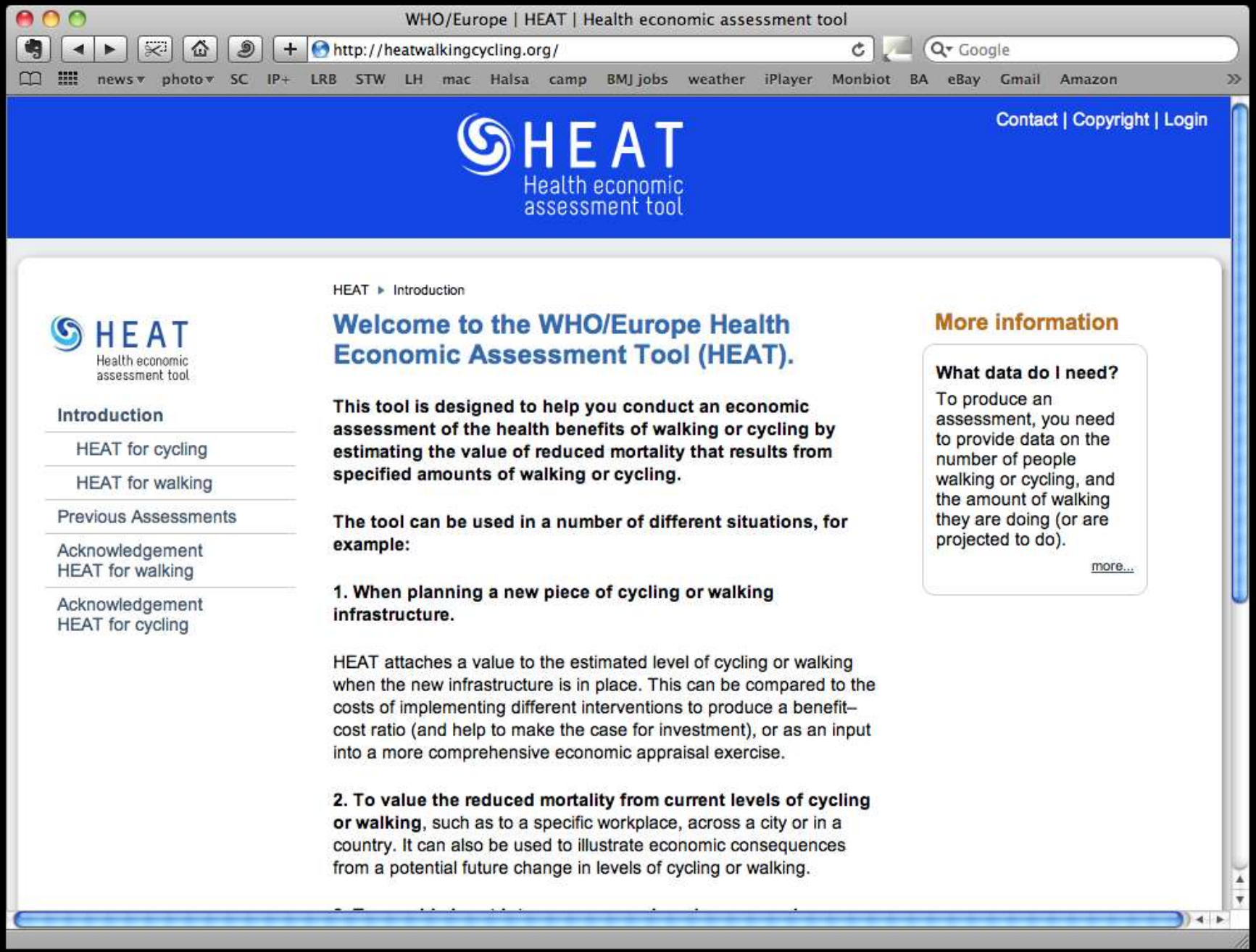
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HEAT
Health economic assessment tool
Introduction
HEAT for cycling
HEAT for walking
Previous Assessments
Acknowledgement HEAT for walking
Acknowledgement HEAT for cycling
HEAT ▸ Introduction
Welcome to the WHO/Europe Health Economic Assessment Tool (HEAT).
This tool is designed to help you conduct an economic assessment of the health benefits of walking or cycling by estimating the value of reduced mortality that results from specified amounts of walking or cycling.
The tool can be used in a number of different situations, for example:
1. When planning a new piece of cycling or walking infrastructure.
HEAT attaches a value to the estimated level of cycling or walking when the new infrastructure is in place. This can be compared to the costs of implementing different interventions to produce a benefit–cost ratio (and help to make the case for investment), or as an input into a more comprehensive economic appraisal exercise.
2. To value the reduced mortality from current levels of cycling or walking, such as to a specific workplace, across a city or in a country. It can also be used to illustrate economic consequences from a potential future change in levels of cycling or walking.
More information
What data do I need?
To produce an assessment, you need to provide data on the number of people walking or cycling, and the amount of walking they are doing (or are projected to do).
more...

HEAT Health economic assessment tool

- Introduction
  - HEAT for cycling
  - HEAT for walking
- Return to current assessment
- Previous Assessments
- **Acknowledgement HEAT for walking**
- Acknowledgement HEAT for cycling

HEAT ▸ Acknowledgements

Acknowledgements

Health Economic Assessment Tool for walking

This tool has been developed from an original idea of Harry Rutter, National Obesity Observatory England, United Kingdom and it is based on the principles of the Health Economic Assessment Tool for Cycling first published in 2007.

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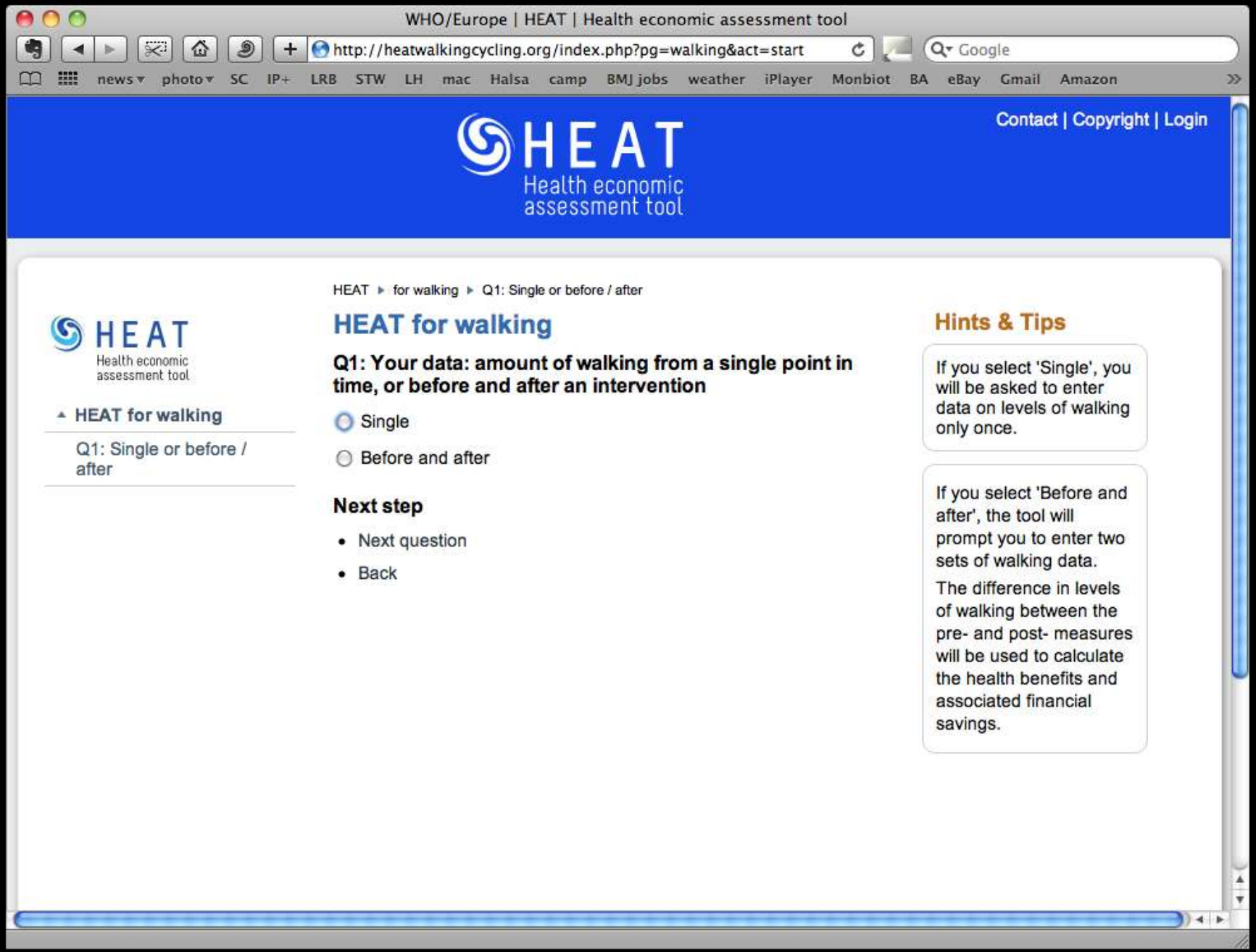
More information

Acknowledgement for HEAT for cycling

more...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HEAT for walking
Q1: Single or before / after
HEAT ▸ for walking ▸ Q1: Single or before / after
HEAT for walking
Q1: Your data: amount of walking from a single point in time, or before and after an intervention
Single
Before and after
Next step
Next question
Back
Hints & Tips
If you select 'Single', you will be asked to enter data on levels of walking only once.
If you select 'Before and after', the tool will prompt you to enter two sets of walking data.
The difference in levels of walking between the pre- and post- measures will be used to calculate the health benefits and associated financial savings.

HEAT ▸ for walking ▸ Q2: Walking data type

HEAT Health economic assessment tool

▲ HEAT for walking

Q1: Single or before / after

Q2: Walking data type

HEAT for walking

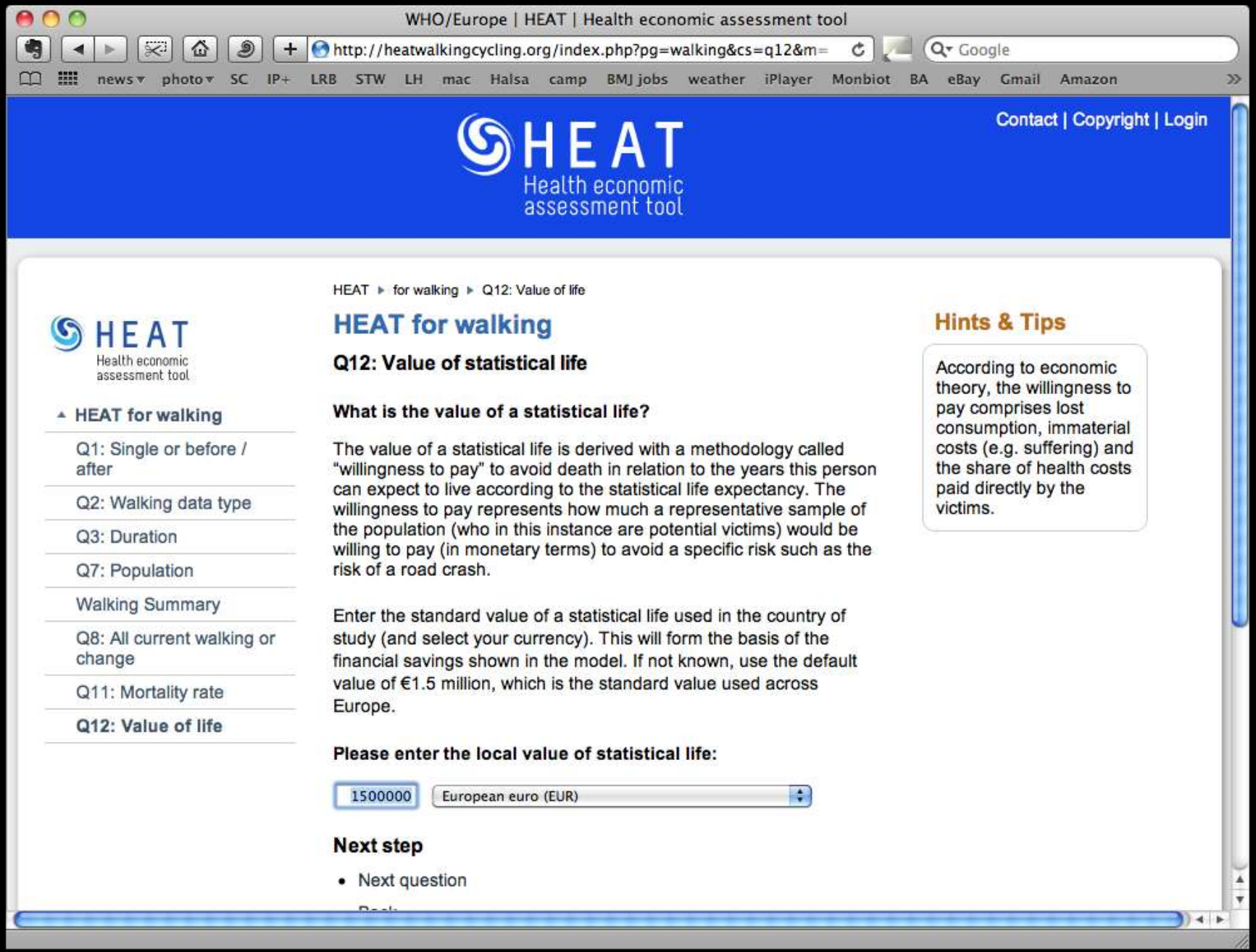
Q2: Enter your walking data

The HEAT model requires an estimate of the average duration spent walking in the study population in order to calculate the corresponding health benefit (based on a relative risk from a review of the epidemiological literature on the health benefits of walking). This duration can be entered directly, if available (and this is the most direct data entry route), or calculated based on the distance, number of steps, or number of trips.

- ○ Duration (average time walked per person)
- ○ Distance (average distance walked per person)
- ○ Steps (average number of steps taken per person)
- ○ Trips (average per person or total observed across a population)

Next step

- Next question
- Back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HEAT for walking
Q1: Single or before / after
Q2: Walking data type
Q3: Duration
Q7: Population
Walking Summary
Q8: All current walking or change
Q11: Mortality rate
Q12: Value of life
HEAT ▸ for walking ▸ Q12: Value of life
HEAT for walking
Q12: Value of statistical life
What is the value of a statistical life?
The value of a statistical life is derived with a methodology called "willingness to pay" to avoid death in relation to the years this person can expect to live according to the statistical life expectancy. The willingness to pay represents how much a representative sample of the population (who in this instance are potential victims) would be willing to pay (in monetary terms) to avoid a specific risk such as the risk of a road crash.
Enter the standard value of a statistical life used in the country of study (and select your currency). This will form the basis of the financial savings shown in the model. If not known, use the default value of €1.5 million, which is the standard value used across Europe.
Please enter the local value of statistical life:
1500000
European euro (EUR)
Next step
Next question
Hints & Tips
According to economic theory, the willingness to pay comprises lost consumption, immaterial costs (e.g. suffering) and the share of health costs paid directly by the victims.

HEAT ▸ for walking ▸ Result

HEAT
Health economic assessment tool

▲ HEAT for walking

Q1: Single or before / after

Q2: Walking data type

Q3: Duration

Q7: Population

Walking Summary

Q8: All current walking or change

Q11: Mortality rate

Q12: Value of life

Q13: Time period for averaging

Q14: Benefit–cost ratio

Q16: Discount rate

Result

HEAT estimate

Reduced mortality as a result of changes in cycling behaviour

The walking data you have entered corresponds to an average of **30** minutes per person per day.

This level of walking provides **an estimated** protective benefit of: **22.67 %** (compared to persons not walking regularly)

From the data you have entered, the number of individuals who benefit from this level of walking is: **10,000**

Out of this many individuals, the number who would be expected to die if they were not walking regularly would be: **72.71**

The number of deaths per year that are prevented by this level of walking is: **16.48**

Financial savings as a result of walking

Currency: EUR

The value of statistical life in your population is:	**1,500,000 EUR**
The annual benefit of this level of walking, per year, is:	**24,721,000 EUR**
The total benefits accumulated over **10** years are:	**247,208,000 EUR**
When future benefits are discounted by **5 %** per year;	
The current value of the average annual benefit, averaged across 10 years is:	**19,089,000 EUR**
The current value of the total benefits accumulated over 10 years is:	**190,888,000 EUR**


PUBLIC SPACES PUBLIC LIFE
copenhagen
jan gehl & lars gemzøe


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