

# Health and complexity: setting the scene

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# Outline

- Population health
- Current public health ‘thinking’: aimed at reducing complexity → limitations
  - Research on determinants
  - Public health interventions
  - Effect studies
- The need for complex systems approaches



# Which factors determine population health?

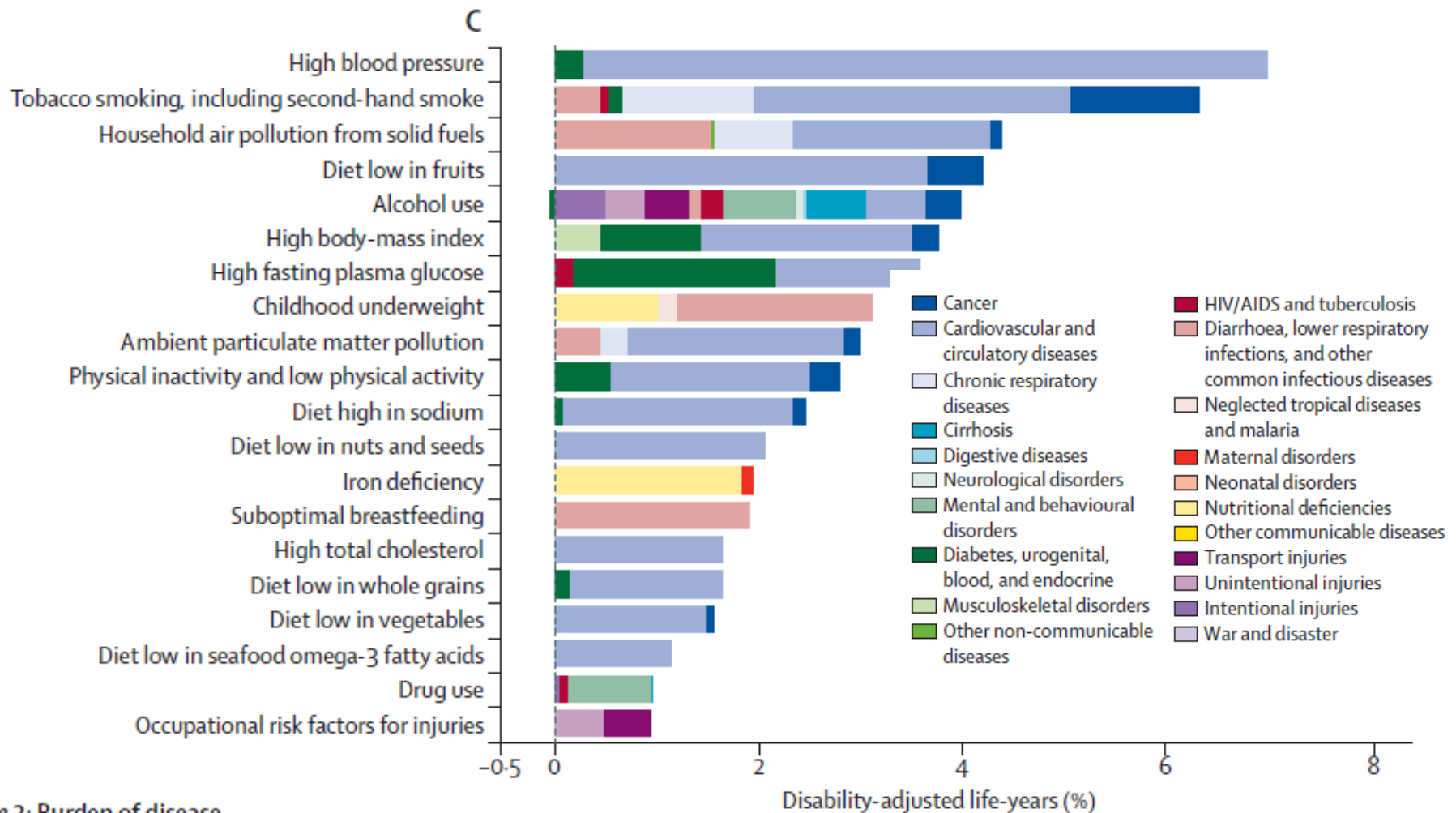


Figure 2: Burden of disease attributable to 20 leading risk factors in 2010, expressed as a percentage of global disability-adjusted life-years both sexes (C).

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  1. Research on determinants
  2. Public health interventions
  3. Effect studies
- The need for complex systems approaches

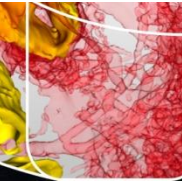
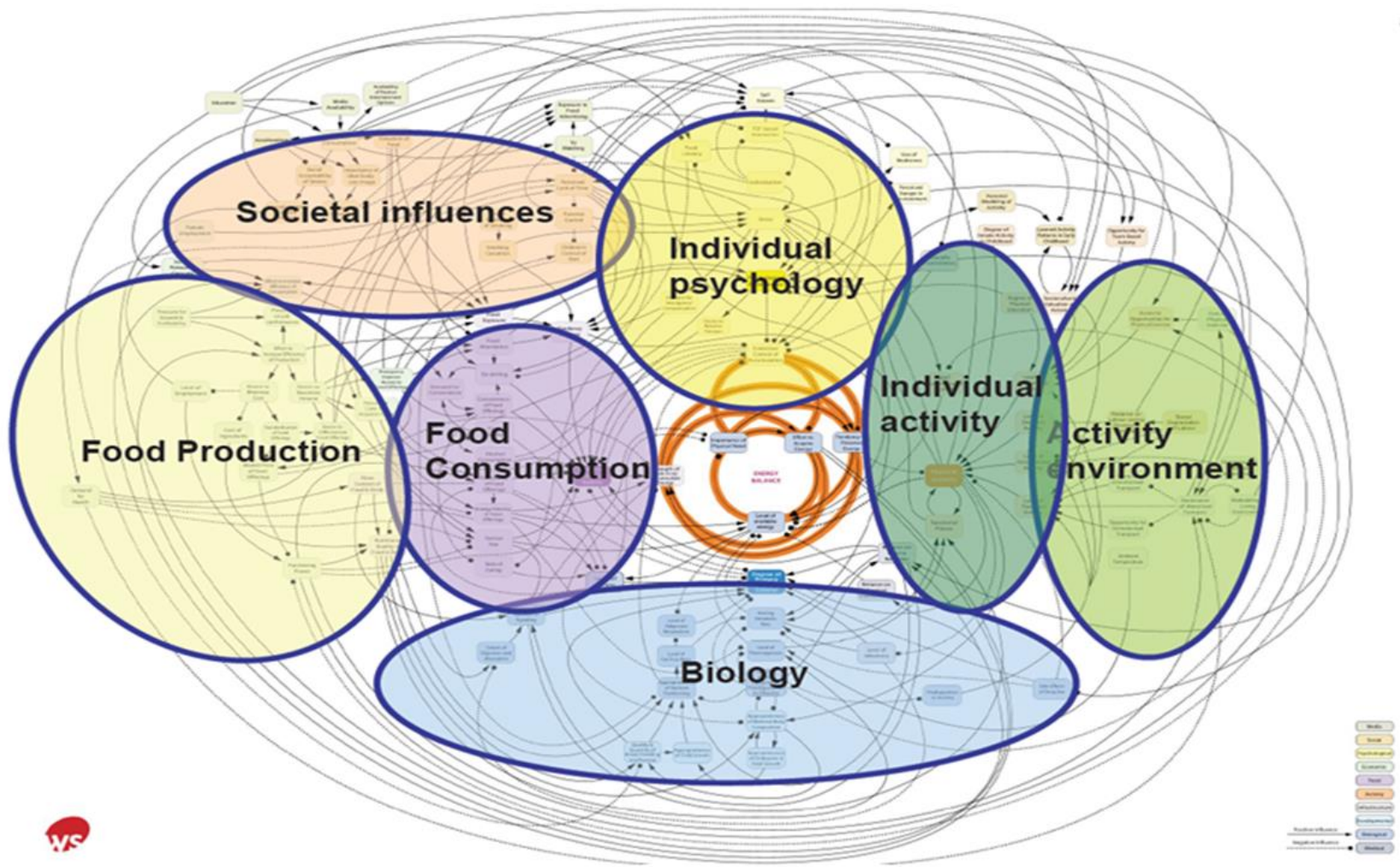
# 1. Research on determinants

- Example: obesity 'epidemic'
  - Overweight/obesity as a product of eating behaviour and physical activity
  - Identification of risk factors at individual level: low educational level, migration background, screen use etc.
- Reality is more complex...
  - **'Bigger picture'**: foodproduction, transport, social stratification etc. – thus: influences that shape individual health behaviour





# Foresight model – obesity system map



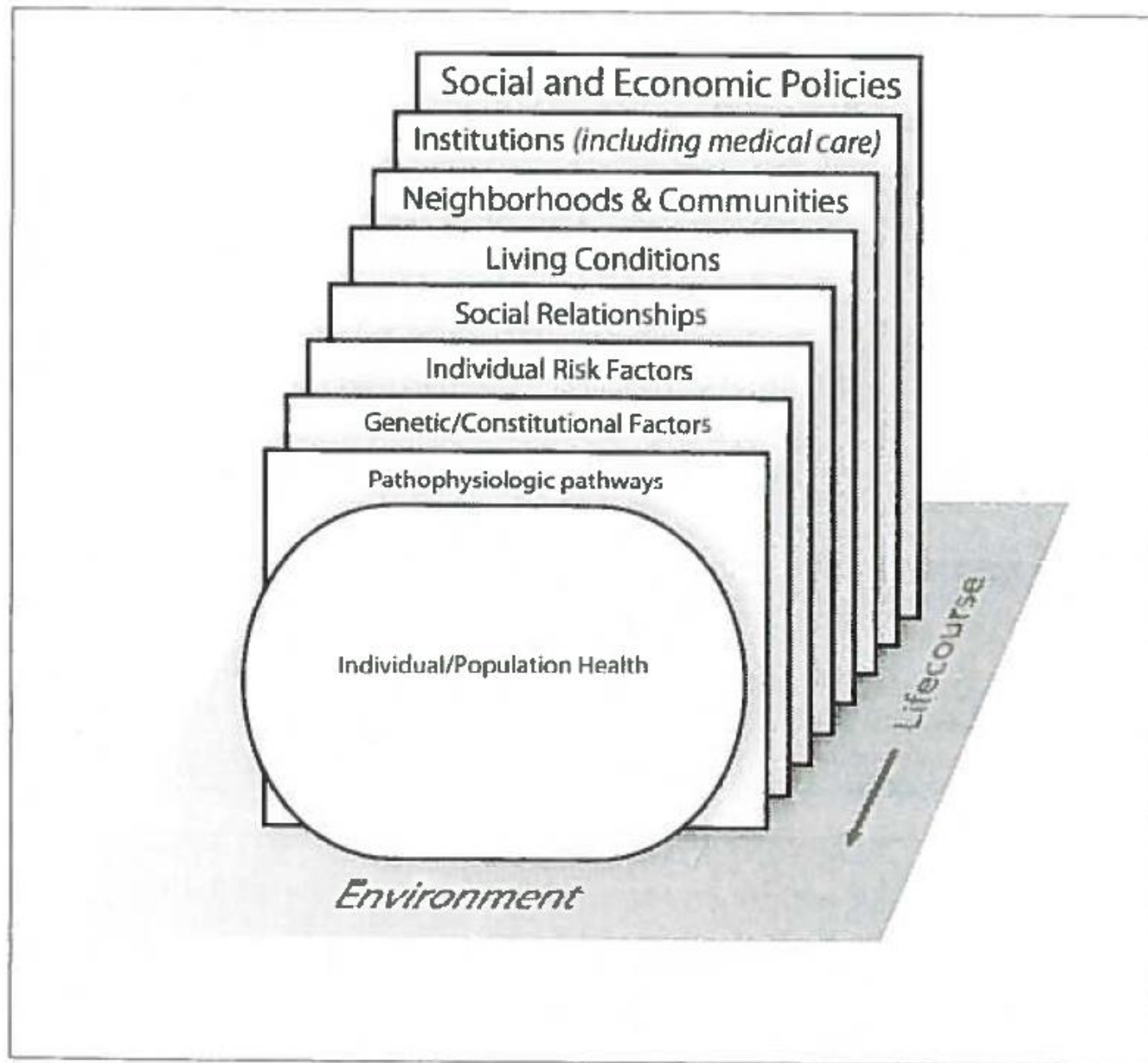


Figure 1. Multilevel and multiscale determinants of population health and health disparities<sup>16</sup>

Source: Kaplan, Diez Roux, Simon, Galea 2017

## 2. Public health interventions: mainly targetting the individual, in a short time period – example: preventing diabetes in South Asian migrants

### Intensive Lifestyle Intervention in General Practice to Prevent Type 2 Diabetes among 18 to 60-Year-Old South Asians: 1-Year Effects on the Weight Status and Metabolic Profile of Participants in a Randomized Controlled Trial

Wanda M. Admiraal<sup>1,2\*</sup>, Everlina M. Vlaar<sup>1</sup>, Vera Nierkens<sup>1</sup>, Frits Holleman<sup>2</sup>, Barend J. C. Middelkoop<sup>3,4</sup>, Karien Stronks<sup>1</sup>, Irene G. M. van Valkengoed<sup>1</sup>

*Discussion:* An intensive, culturally targeted, lifestyle intervention of 1 year did not improve weight status and metabolic profile of South-Asians at risk of type 2 diabetes. The laborious recruitment, high drop-out, and lack of effectiveness emphasise the difficulty of realising health benefits in practice and suggest that this strategy might not be the optimal approach for this population.

**Citation:** Admiraal WM, Vlaar EM, Nierkens V, Holleman F, Middelkoop BJC, et al. (2013) Intensive Lifestyle Intervention in General Practice to Prevent Type 2 Diabetes among 18 to 60-Year-Old South Asians: 1-Year Effects on the Weight Status and Metabolic Profile of Participants in a Randomized Controlled Trial. PLoS ONE 8(7): e68605. doi:10.1371/journal.pone.0068605



# Individual response fails as it neglects the environment in which an individual lives

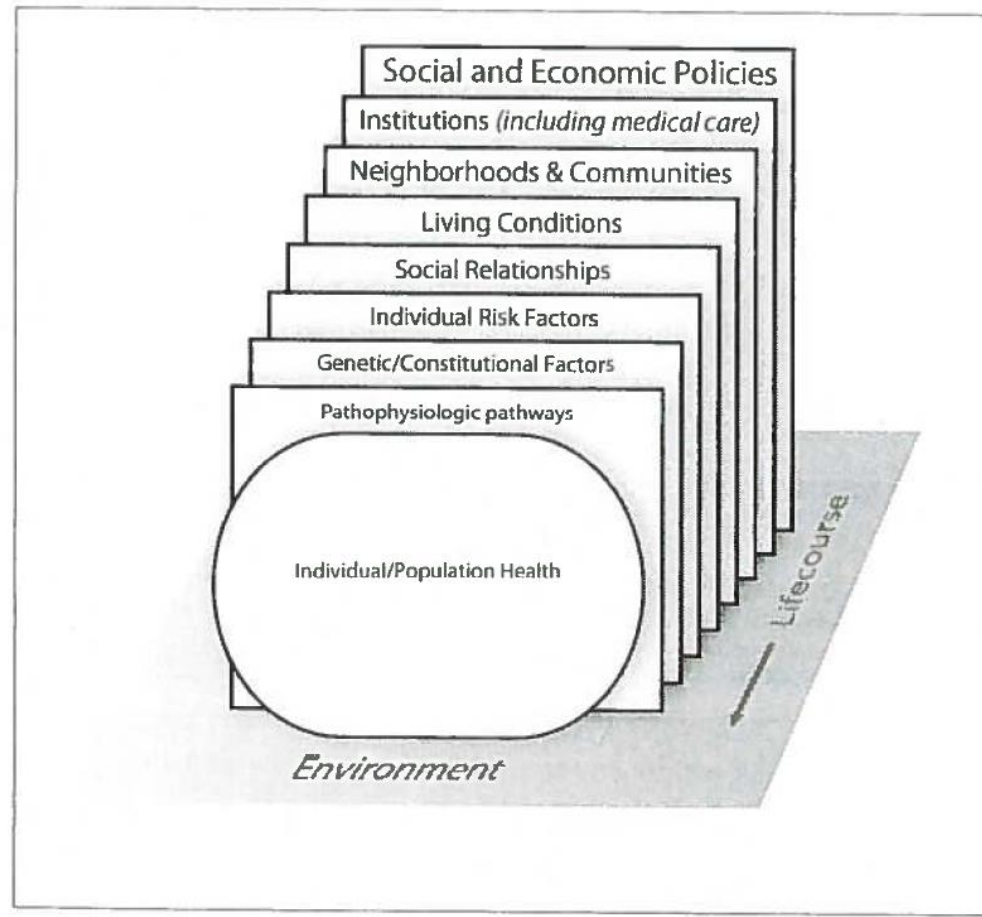



Figure 1. Multilevel and multiscale determinants of population health and health disparities<sup>16</sup>

### **3. Effect studies: Randomized Controlled Trial as the highest standard**

- RCT: controlled conditions, in contrast to complexity of real-world settings
- Aimed at assessing whether interventions has an effect (yes/no), instead of asking: why an effect, for whom and under what conditions

# A need for complex systems approaches

- Growing consensus: the way we promote and study health does not acknowledge the complexities of real-world settings  
→ complex systems approaches

Viewpoint 

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## The need for a complex systems model of evidence for public health



*Harry Rutter, Natalie Savona, Ketevan Glonti, Jo Bibby, Steven Cummins, Diane T Finegood, Felix Greaves, Laura Harper, Penelope Hawe, Laurence Moore, Mark Petticrew, Eva Rehfuss, Alan Shiell, James Thomas, Martin White*

Despite major investment in both research and policy, many pressing contemporary public health challenges remain. To date, the evidence underpinning responses to these challenges has largely been generated by tools and

which require high levels of individual agency, have low reach and impact, and tend to widen health inequalities.<sup>9-11</sup> Shifts within multiple elements across the many systems that influence obesity are required, some of which might

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## Setting the scene ....

- ... for two examples of complex system approaches:
  - Guido Veldhuis (TNO): burn-out / personalized health
  - Wilma Waterlander (AMC): food systems / population health
- ... for future collaborations with experts in other areas and disciplines

# Thank you for your attention

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