

# ADA Update on Epidemiology and Economic impact of diabetes

David Beran MSc PhD  
Assistant Professor

Division of Tropical and Humanitarian Medicine,  
Department of Community Medicine and Primary Care  
Geneva University Hospitals and University of Geneva  
Faculty Diabetes Center, Faculty of Medicine



Hôpitaux  
Universitaires  
Genève



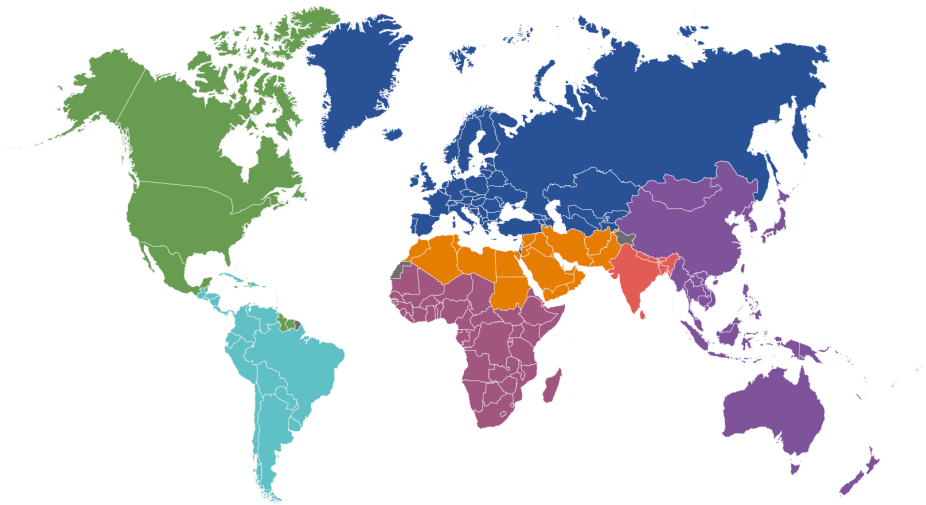
**UNIVERSITÉ  
DE GENÈVE**

**FACULTÉ DE MÉDECINE**

# Epidemiology globally

## Prevalence (cases) of diabetes in ages 20-79

World	North America & Caribbean (NAC)	Europe (EUR)	Western Pacific (WP)
2045: 783 million	2045: 63 million	2045: 69 million	2045: 260 million
2030: 643 million	2030: 57 million	2030: 67 million	2030: 238 million
2021: 537 million	2021: 51 million	2021: 61 million	2021: 206 million
↑ 46% increase	↑ 24% increase	↑ 13% increase	↑ 27% increase

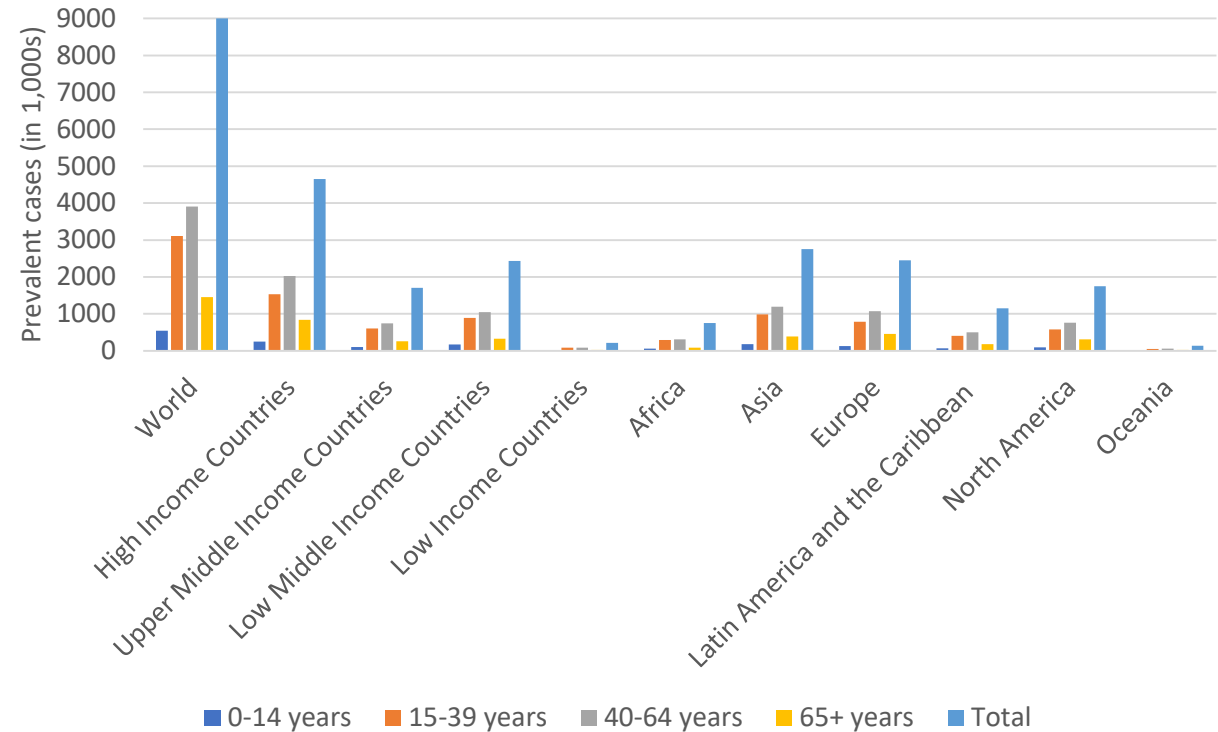


South & Central America (SACA)	Africa (AFR)	Middle East & North Africa (MENA)	South-East Asia (SEA)
2045: 49 million	2045: 55 million	2045: 136 million	2045: 152 million
2030: 40 million	2030: 33 million	2030: 95 million	2030: 113 million
2021: 32 million	2021: 24 million	2021: 73 million	2021: 90 million
↑ 50% increase	↑ 134% increase	↑ 87% increase	↑ 68% increase

537 million people 20-79 years of age (2021)  
Largest increase in Africa

**International Diabetes Federation 2021**

## Prevalence (cases) of type 1 diabetes

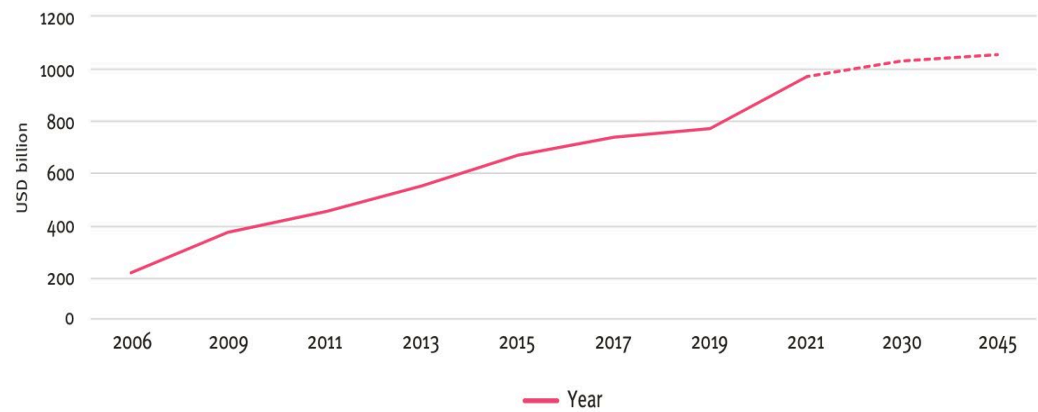


9 million people with type 1 diabetes (2017)  
Global average increase of incidence in 3%

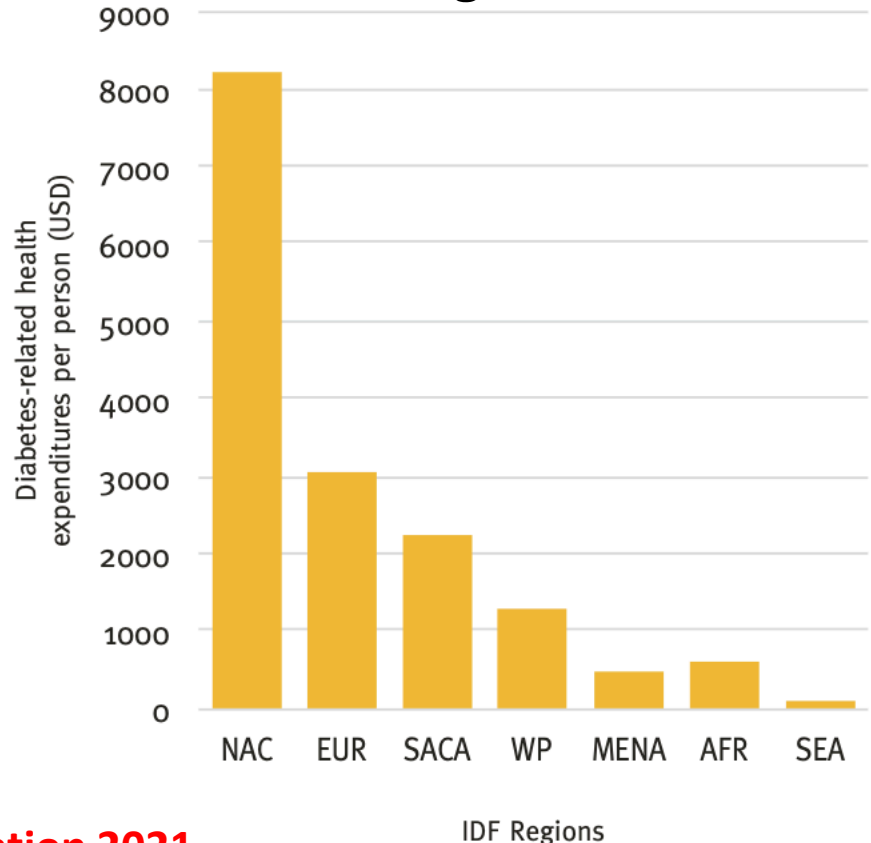
**Green et al. 2021**

# Economics of diabetes globally

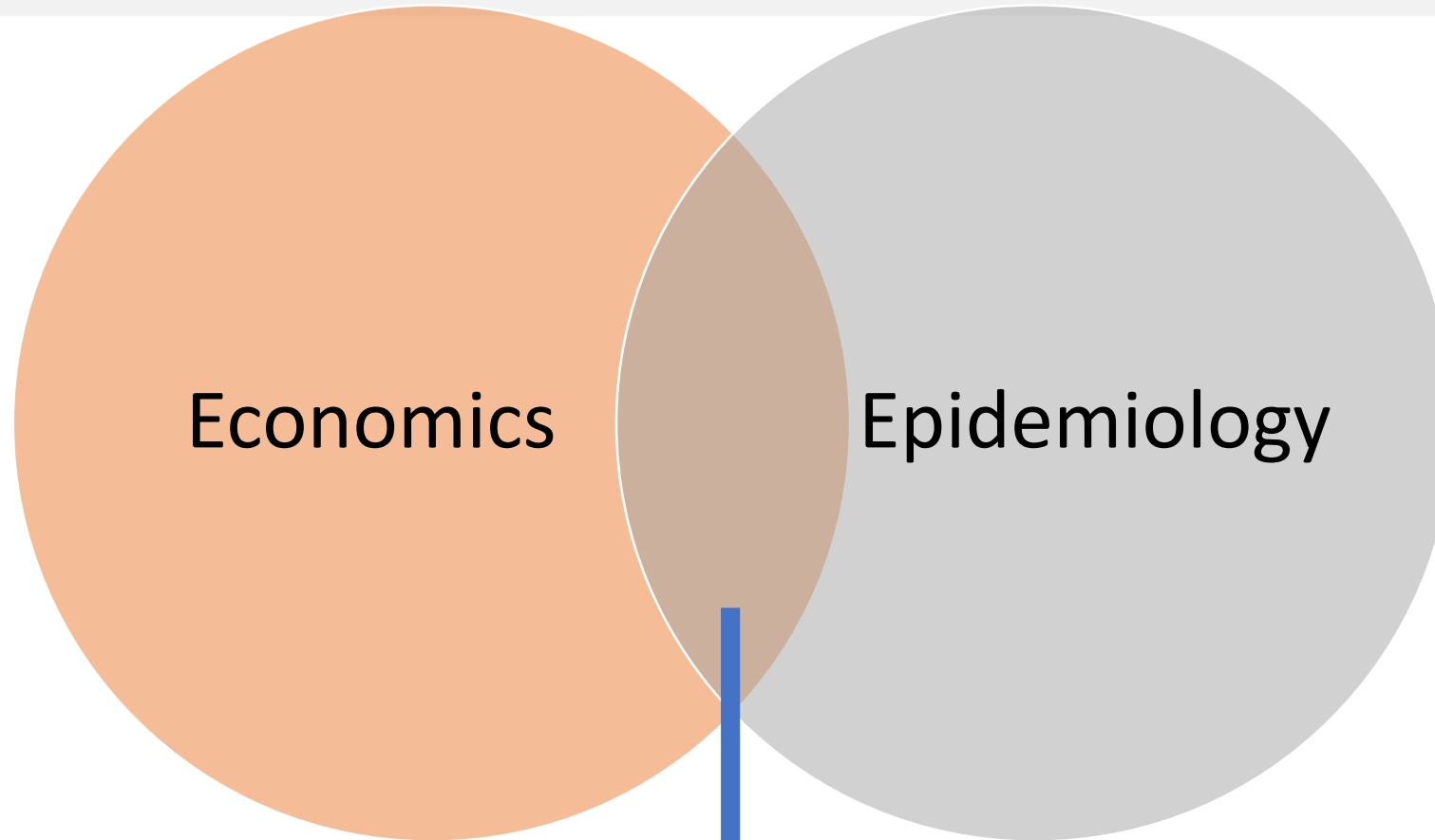
**Total diabetes-related health expenditure for adults (20–79 years) with diabetes from 2006 to 2045**



**Diabetes-related health expenditure (USD) per person with diabetes (20–79 years) in 2021 by IDF Region**

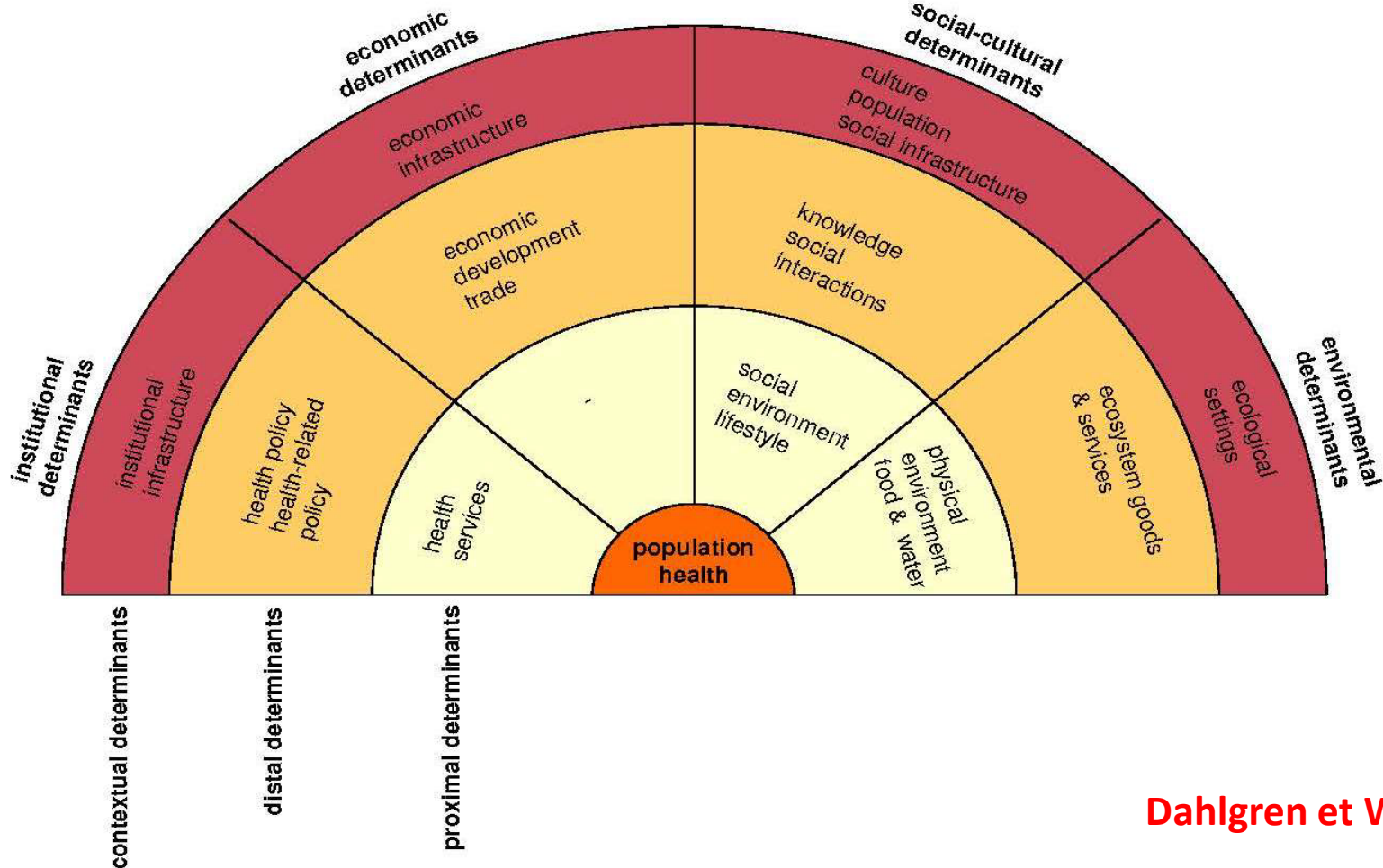


# What happened at the ADA?



**Impact of diabetes on specific populations  
Focus on Social Determinants of Health**

# Social determinants of health



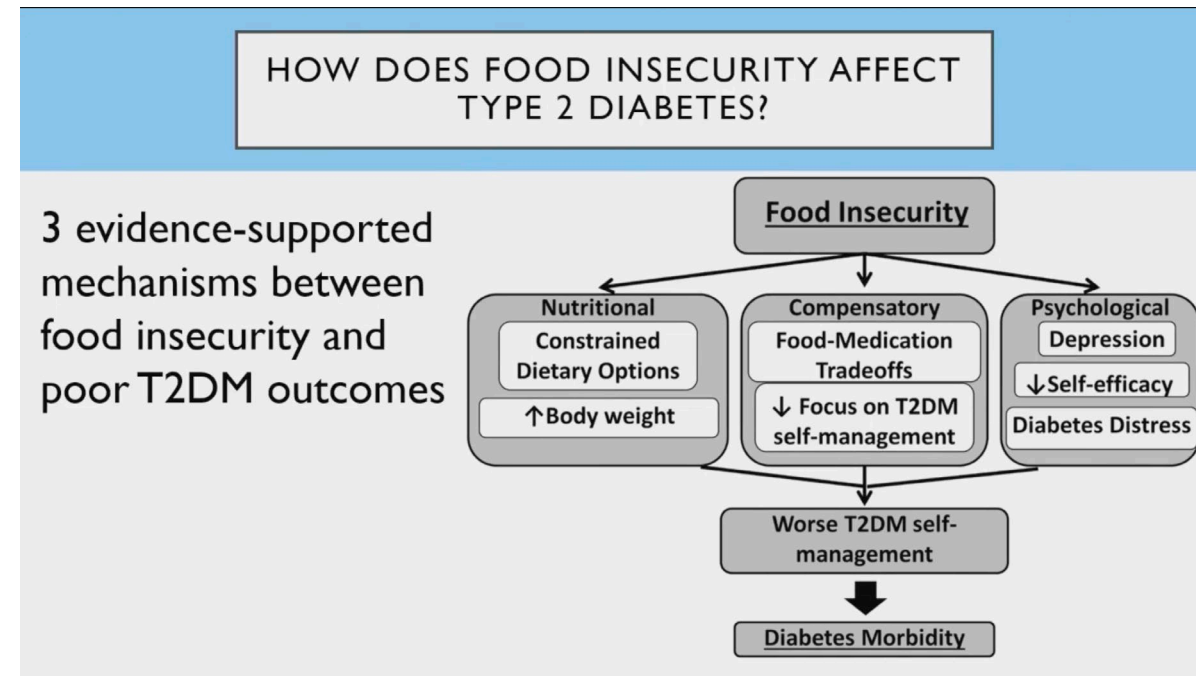
# Populations/Issues discussed

- Ethnic groups
  - Migrants
  - Historical contexts
  - Race
  - Racism
  - Lack of cultural understanding
- Socio-economic positions
  - Education
- Rural populations
- Incidence and prevalence trends
- Stratification of risk
- Population health versus health system versus Personalised medicine
- Access to the health system
  - Medicines
  - Services
  - Digital divide
  - Human resources
- Patient preference
- Food
  - Security
  - Culture and diet

# Highlights – Food insecurity

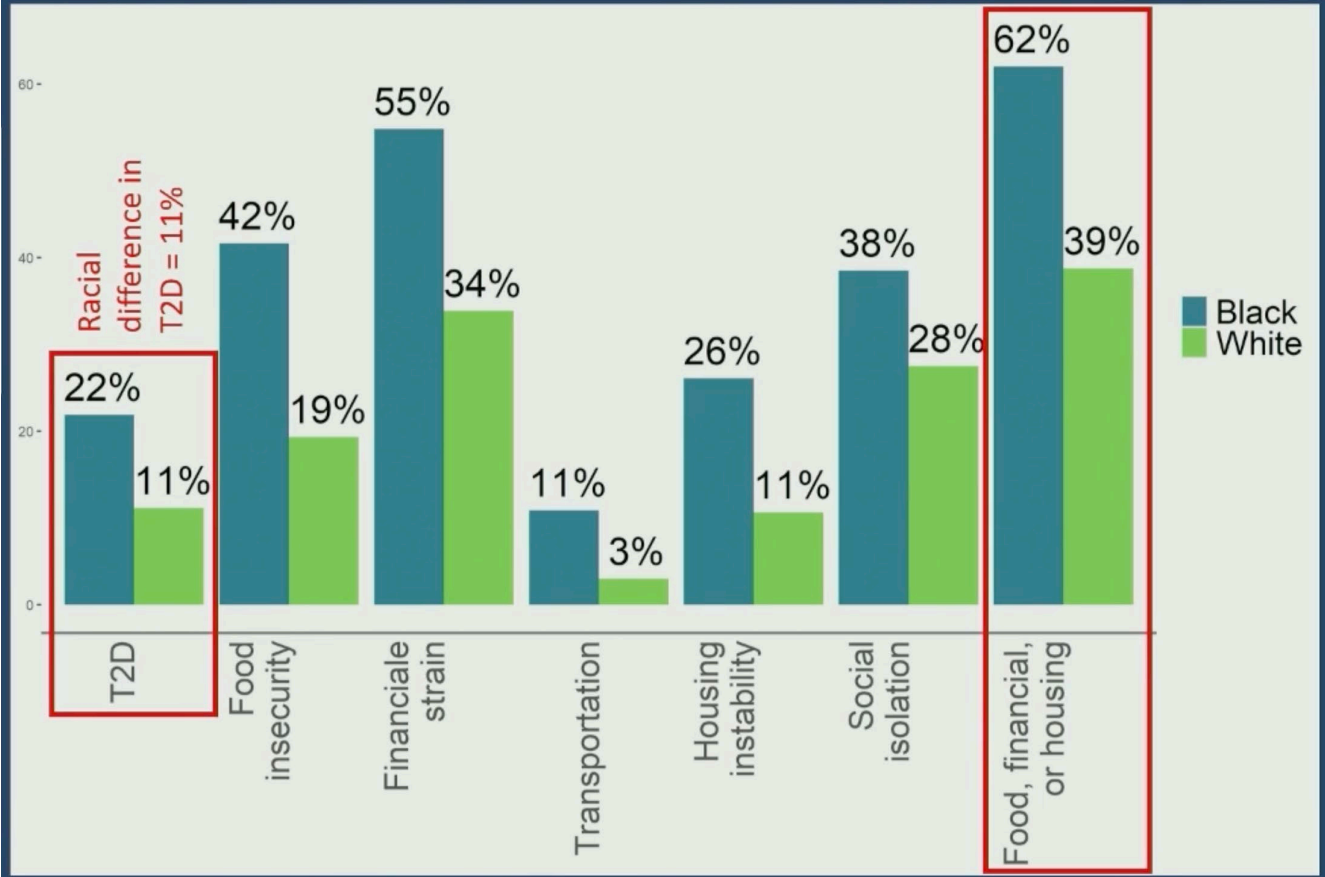
- Lack of access to food for healthy life
- 10.4% of Americans /  $\approx$  20% of people with diabetes in 2021
- Link between food security and prevention and management of type 2 diabetes
- Impact on different populations
  - Income
    - Race
  - Household size
  - Access to food
    - Food deserts
  - Trade offs
    - Food for the family versus diabetes medicines

S. Berkowitz ADA presentation 2023



# Highlights – Race and Racism

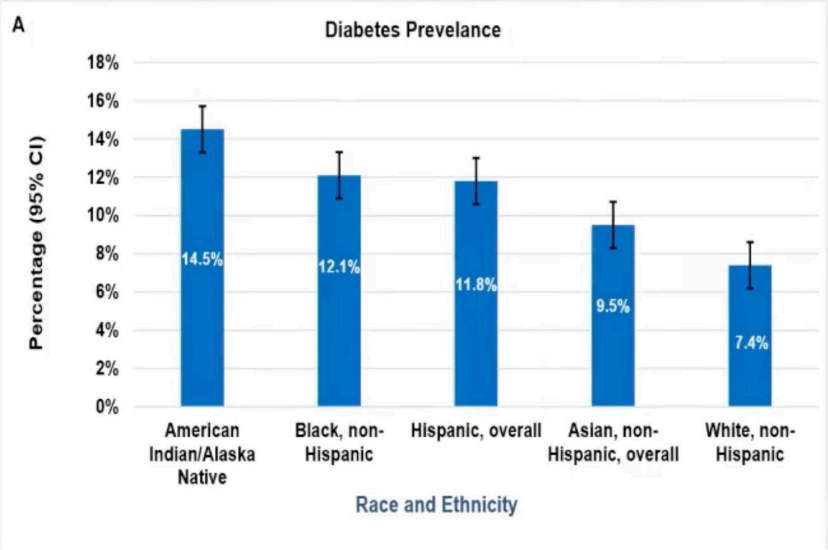
Type 2 diabetes and social risk factors





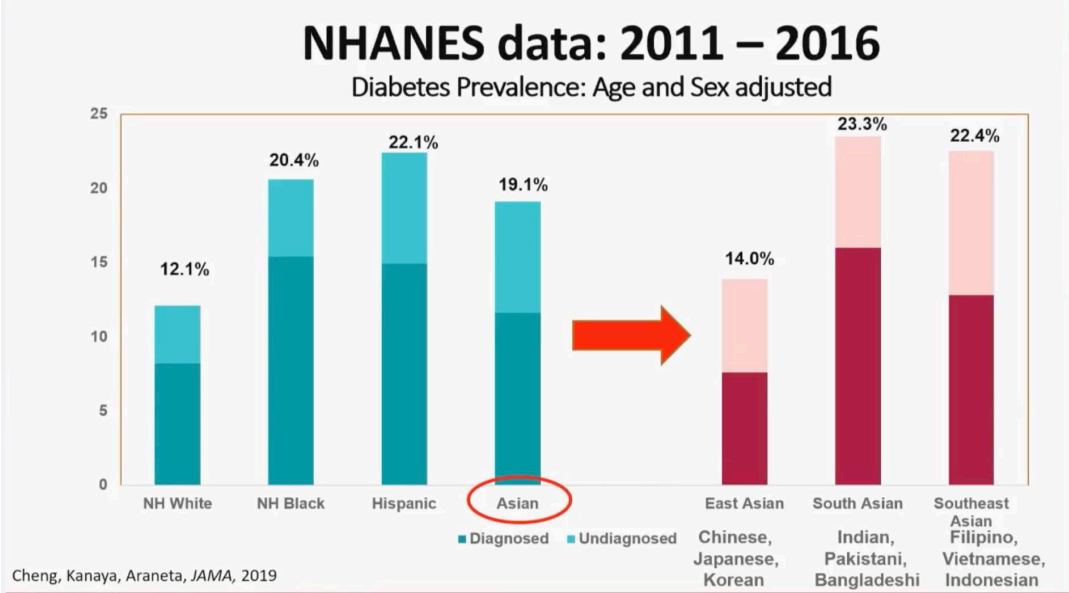
# Highlights – Race and Racism

## Race and Ethnicity and diabetes prevalence



Data Source: CDC. National Diabetes Statistics Report 2022. [http](http://www.cdc.gov/diabetes/data/statistics-reports/)

F. Hill-Briggs ADA presentation 2023



Cheng, Kanaya, Araneta, JAMA, 2019

A. Kanaya ADA presentation 2023

# Highlights – Race and Racism

- Racism as a Social Determinant of Health
  - American Public Health Association declared racism a public health crisis
    - US Centers for Disease Control defines racism as: “a system consisting of structures, policies and practices and norms that assigns value and determines opportunity based on the way people look and the color of their skin.”
  - Vicious cycle

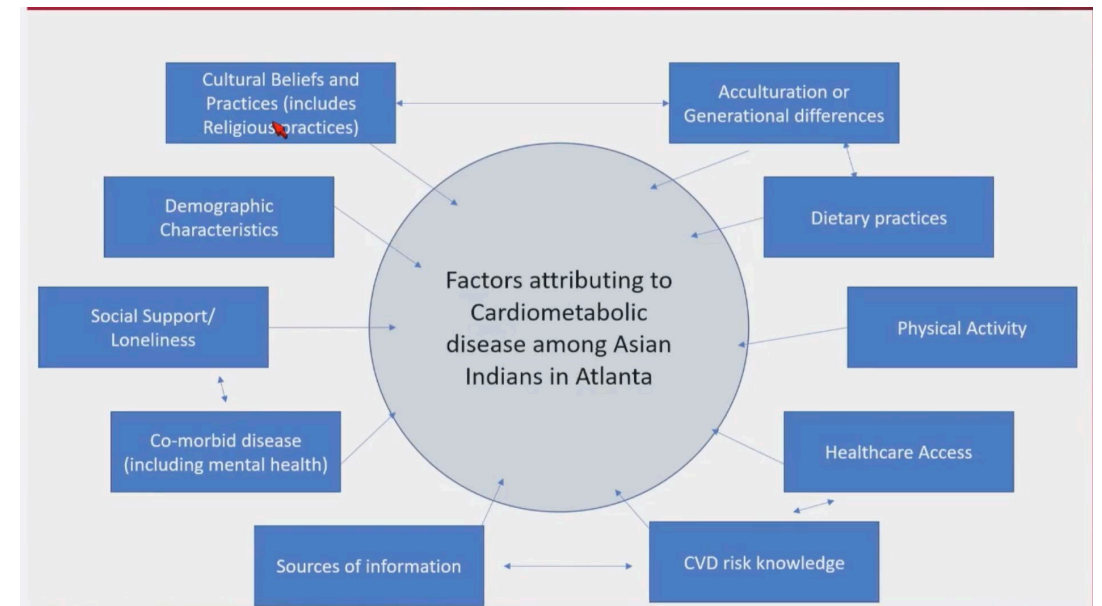
## Neighbourhood and housing disparities

	Black/African Americans	White Americans
Persons living in high poverty neighborhoods/census tracts	20%	4%
Persons living in extreme poverty neighborhoods/census tracts	25.2%	7.5%
Home ownership rate	45.3%	71.3%
Mortgage applications denied rate	18.1%	6.9%
Among homeless families with children	53.1%	35.0%

U.S. National Equity Atlas, 2019; U.S. Census CPS/HVS, 2021; 2020 Annual Homeless assessment Report

# Highlights – Migration

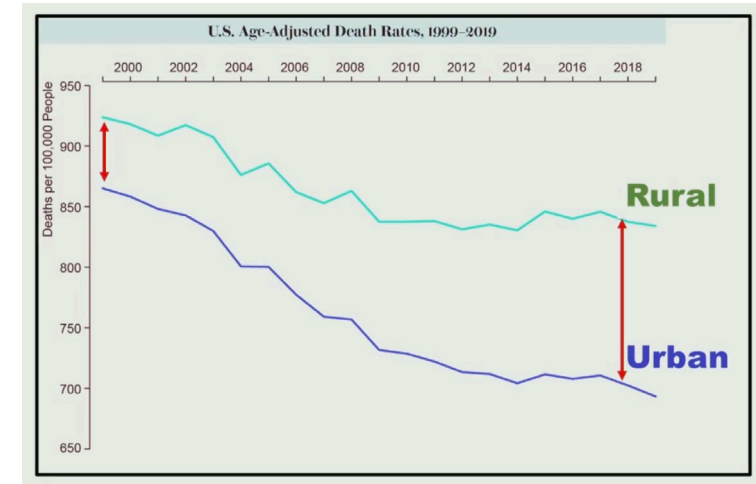
- Migrants
  - Different populations
    - Education
    - Language
    - Culture
    - Religion
    - Food
    - Healthcare practices
- First generation
  - Exposures
- Transitions with different generations
  - Acculturation
    - Length of stay in US
    - Language proficiency
    - Foods eaten
    - Etc.



**M. Shah ADA presentation 2023**

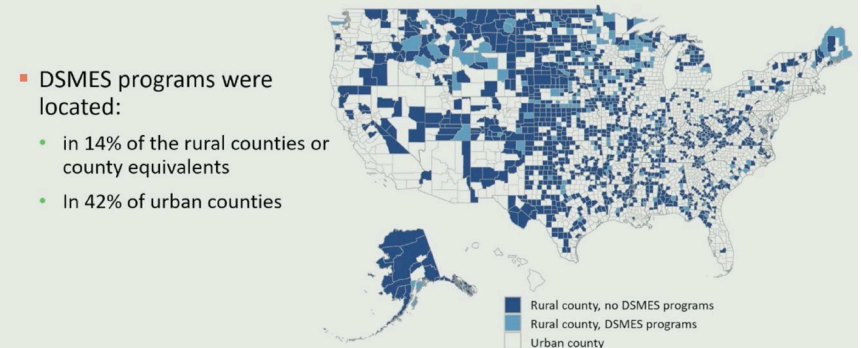
# Highlights – Rural populations

- 15% of US population live in rural areas
  - Shift in mortality rates in the 1970s between rural and urban areas
  - Not all rural areas are equivalent (South of US)
  - Higher mortality heart disease and stroke
  - Higher rates of smoking, hypertension and obesity
  - Less leisure time physical activity
  - Poorer populations
- Healthcare
  - Less access
  - Lower insurance rates
  - Human resources
- People with diabetes
  - Worse outcomes
- Access to human resources
- Digital divide



**V. Ramachandran ADA presentation 2023**

Diabetes self-management education & support programs in rural counties — United States, 2022



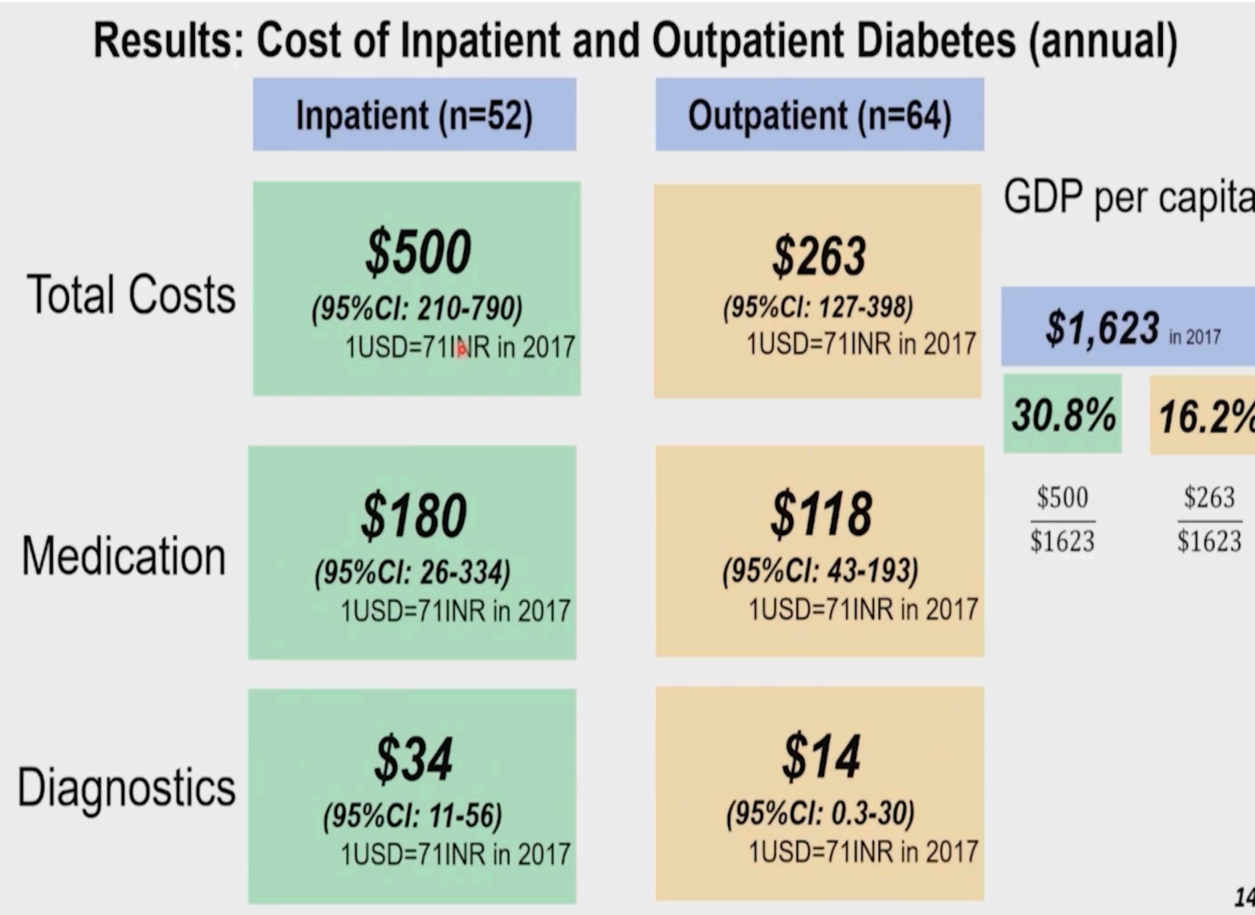
*CDC Division of Diabetes Translation. Unpublished results*

**G. Imperatore ADA presentation 2023**

# Highlights – Access to medicines

- US
  - High out of pocket costs
  - 2022 Inflation Reduction Act
    - Caps on insulin co-payments at US\$ 35 for Medicare recipients
    - 21 US States cap on insulin prices
    - = Reduction in out of pocket costs

- India



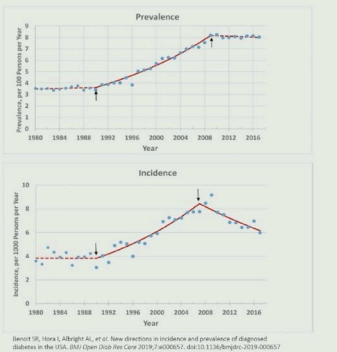
# Highlights – Health system versus wider society

- The US health system as a cause of inequality and a driver
- Wider government policies beyond health
  - Food as medicine
    - Food support e.g. government programs
    - Food policy
  - Sugar taxes
- Personalised medicine (matching of biology to medical care) versus Population health
  - Pros
    - “Right treatment for the right patient at the right time” – **S. Raghavan ADA presentation 2023**
    - Heterogeneity of risk factors
  - Cons
    - Impact at a population level
    - Does not address underlying societal factors
    - Can the person be treated in isolation of their social context?

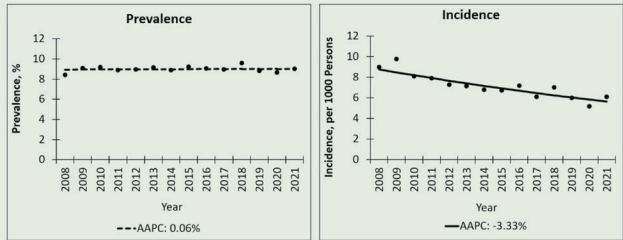
# Highlights – Availability of data

## Background

- Age-adjusted diagnosed diabetes prevalence plateaued in 2009 while incidence started to decline in 2008 through 2017.

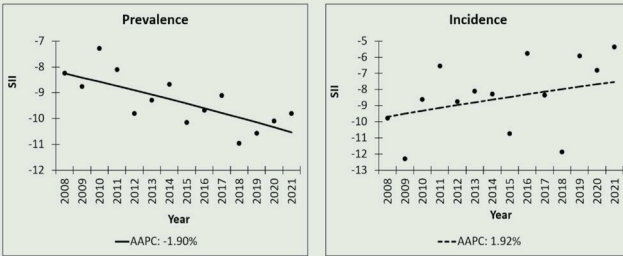


## Age-adjusted Diagnosed Diabetes Prevalence and Incidence U.S. Adults, 2008-2021

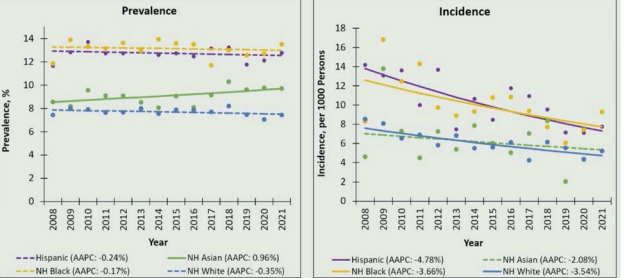


Dotted lines indicate no significant trend (p>0.05); solid lines indicate a significant AAPC (p<0.05)

## Poverty-to-income Ratio: Prevalence and Incidence Inequalities, 2008-2021



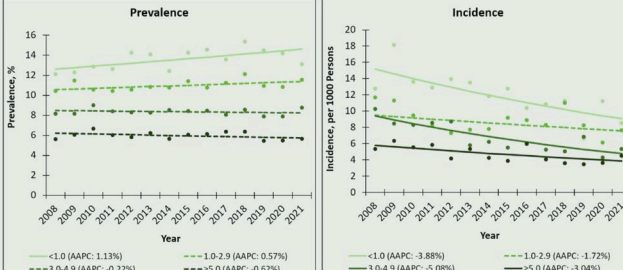
## Age-adjusted Diagnosed Diabetes Prevalence and Incidence by Race and Ethnicity, U.S. Adults, 2008-2021



Dotted lines indicate no significant trend (p>0.05); solid lines indicate a significant AAPC (p<0.05)

Race

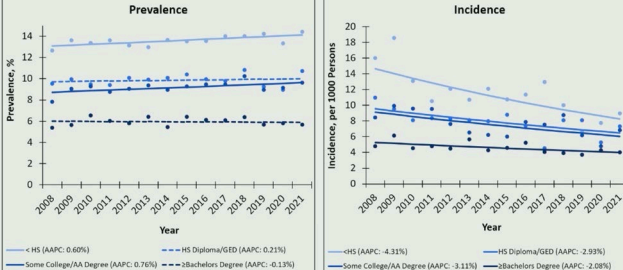
## Age-adjusted Diagnosed Diabetes Prevalence and Incidence by PIR, U.S. Adults, 2008-2021



Dotted lines indicate no significant trend (p>0.05); solid lines indicate a significant AAPC (p<0.05)

Poverty

## Age-adjusted Diagnosed Diabetes Prevalence and Incidence by Education, U.S. Adults, 2008-2021



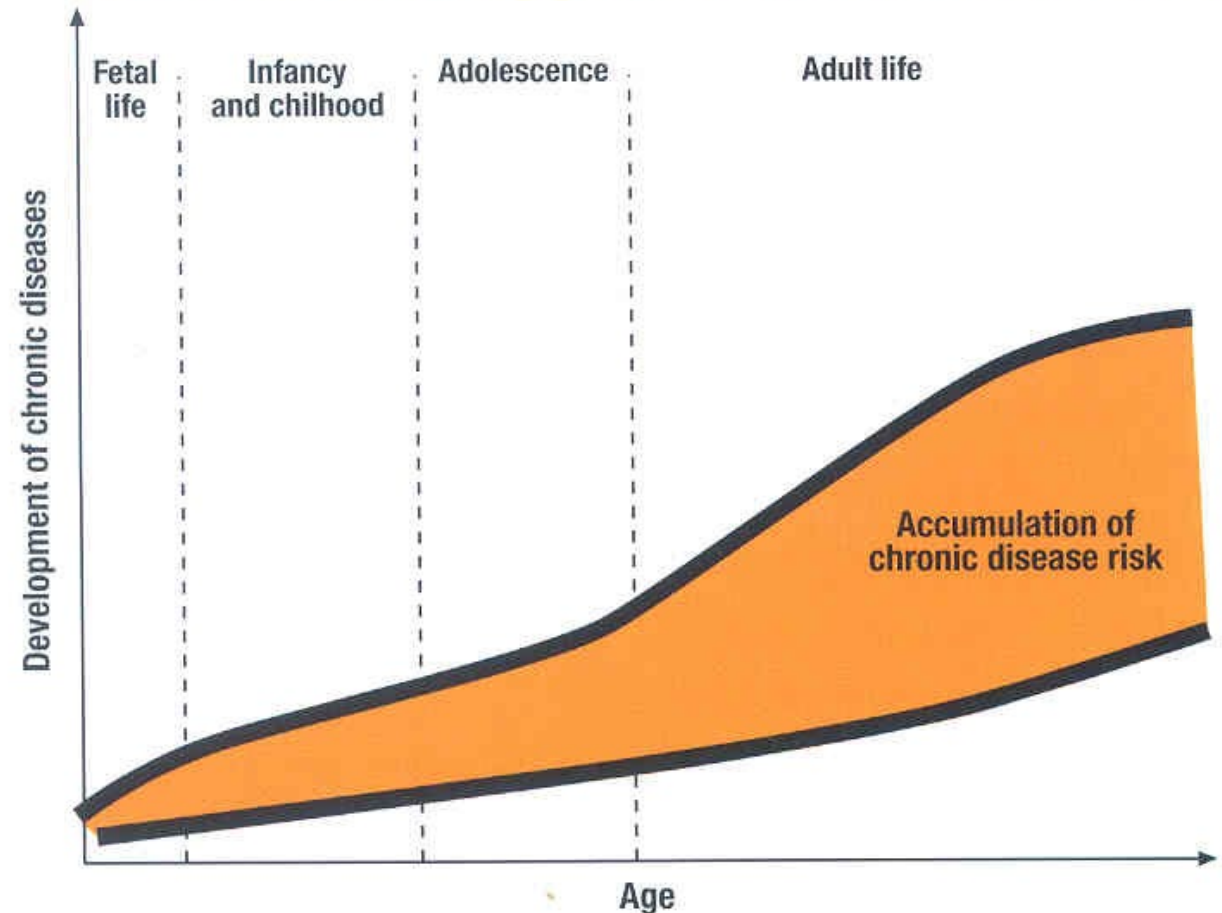
Dotted lines indicate no significant trend (p>0.05); solid lines indicate a significant AAPC (p<0.05)

Education

# Reflections – societal approach

- Importance of societal approaches to diabetes prevention
- Need for wide-ranging policies

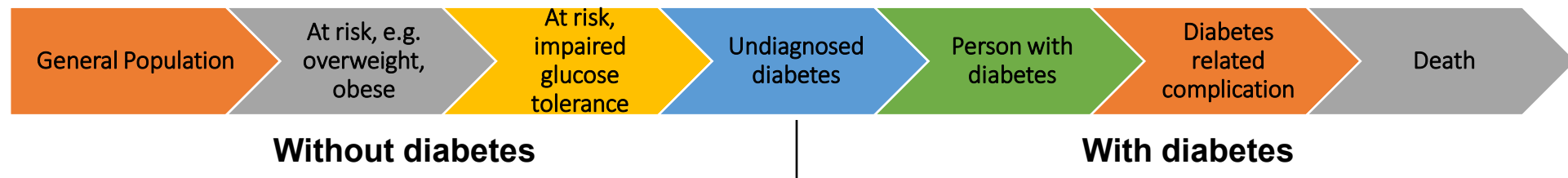
## A life course approach to chronic diseases





# Reflections – different populations

- What role for the health system for these different populations?
- Impact of social, racial, cultural, economic, etc. factors on each of these populations and their access to the appropriate services?



# Reflections – Personalised medicine

- Are health systems ready for this?
- Cost
- Primary care versus centres of excellence
- Medical centric approaches versus addressing the underlying causes
- GLP-1 versus why we have obesity



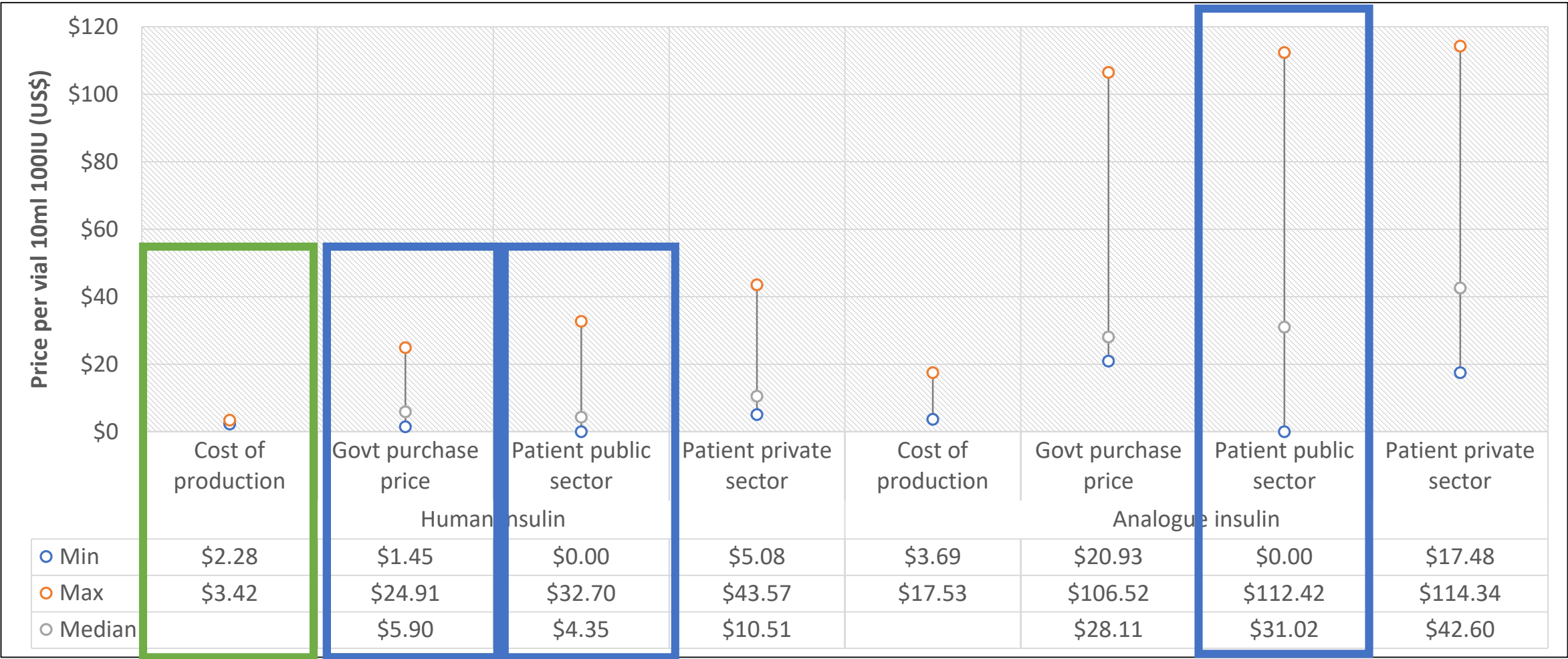
<https://www.test-achats.be/sante/maladies-et-medicaments/medicaments/news/ozempic>



<https://news.yale.edu/2020/03/25/causes-childhood-obesity-worldwide-vary-yale-paper-finds>

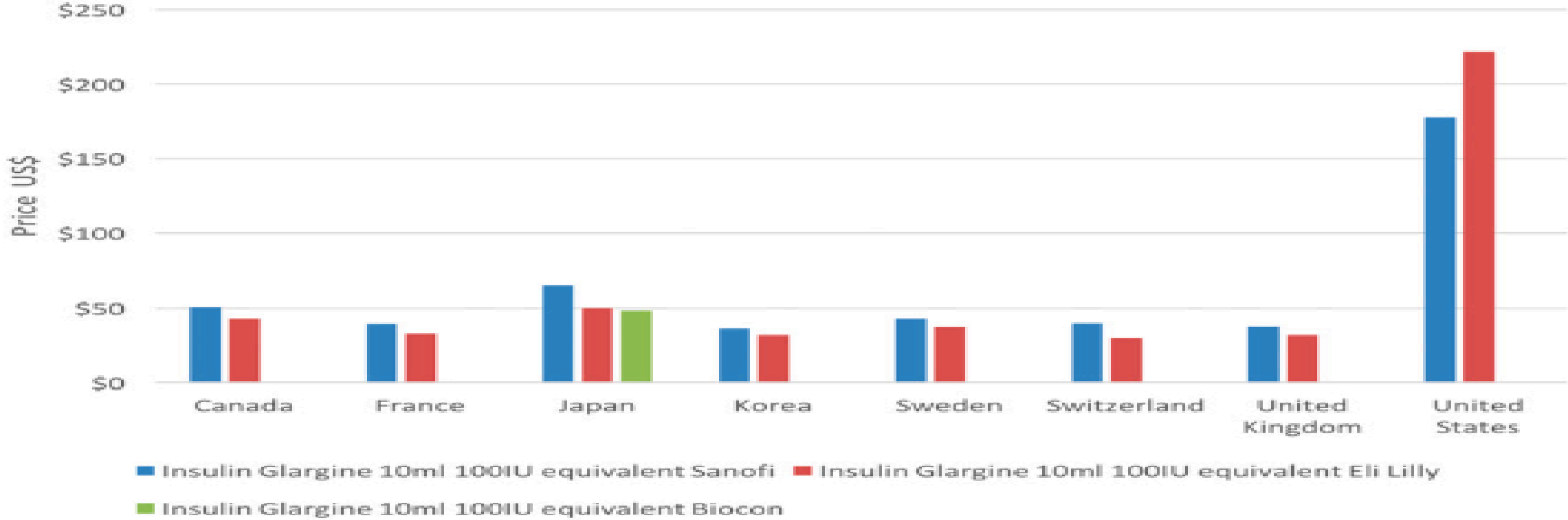
# Reflections – Price of insulin

Brazil, China, Ethiopia, Ghana, India, Indonesia, Jordan, Kenya, Kyrgyzstan, Mali, Pakistan, Russia and Uganda



*Gotham et al. 2018; Ewen et al. 2019*

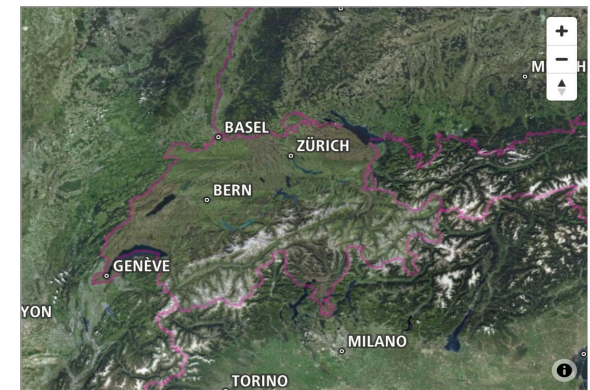
# Reflections – Price of insulin



**Figure 1**—Comparison between originator and biosimilar insulin glargine prices per 10 mL 100 international units (IU)/mL insulin equivalent (US\$). References: Canada (101), France (price excluding dispensing fee) (102), Japan (58), Korea (103), Sweden (104), Switzerland (ex factory price) (105), U.K., (106), and U.S. (user price CVS Boston, MA) (107).

# Reflections for Switzerland – Data and Epidemiology

- Federal Office of Statistics
  - 4% of the population (2017)
- DiabèteSuisse
  - 460,000 people with type 2 diabetes (**IDF: 389,000 20-79 years of age**)
  - 40,000 people with type 1 diabetes (**Green et al.: 20,290**)
- Do we really know?
  - **Bopp et al. 2011** use of existing data to compare with IDF estimates
  - Need data
  - Disaggregation



[https://www.swisstopo.admin.ch/en/geodata/maps/smw/smw\\_imagerybase.html](https://www.swisstopo.admin.ch/en/geodata/maps/smw/smw_imagerybase.html)

# Reflections for Switzerland – Health expenditure

- Total health expenditure CHF 83.3 billion in 2022 (**Federal Office of Statistics**)
- 2020 expenditure on curative care CHF 4,674 versus CHF 351 for preventative care (**WHO Global Health Expenditure Database**)
  - 13.3 times more on curative care

**Table 3.23** Top 10 countries or territories for diabetes-related health expenditure (USD) per person with diabetes (20–79 years) in 2021

Rank	Country or territory	Diabetes-related health expenditure (USD) per person with diabetes (20–79 years)
1	Switzerland	12,828
2	United States of America	11,779
3	Norway	11,166
4	Iceland	8,401
5	Luxembourg	8,193
6	Denmark	7,844
7	Ireland	7,843
8	Sweden	7,675
9	Germany	6,661
10	Austria	6,575

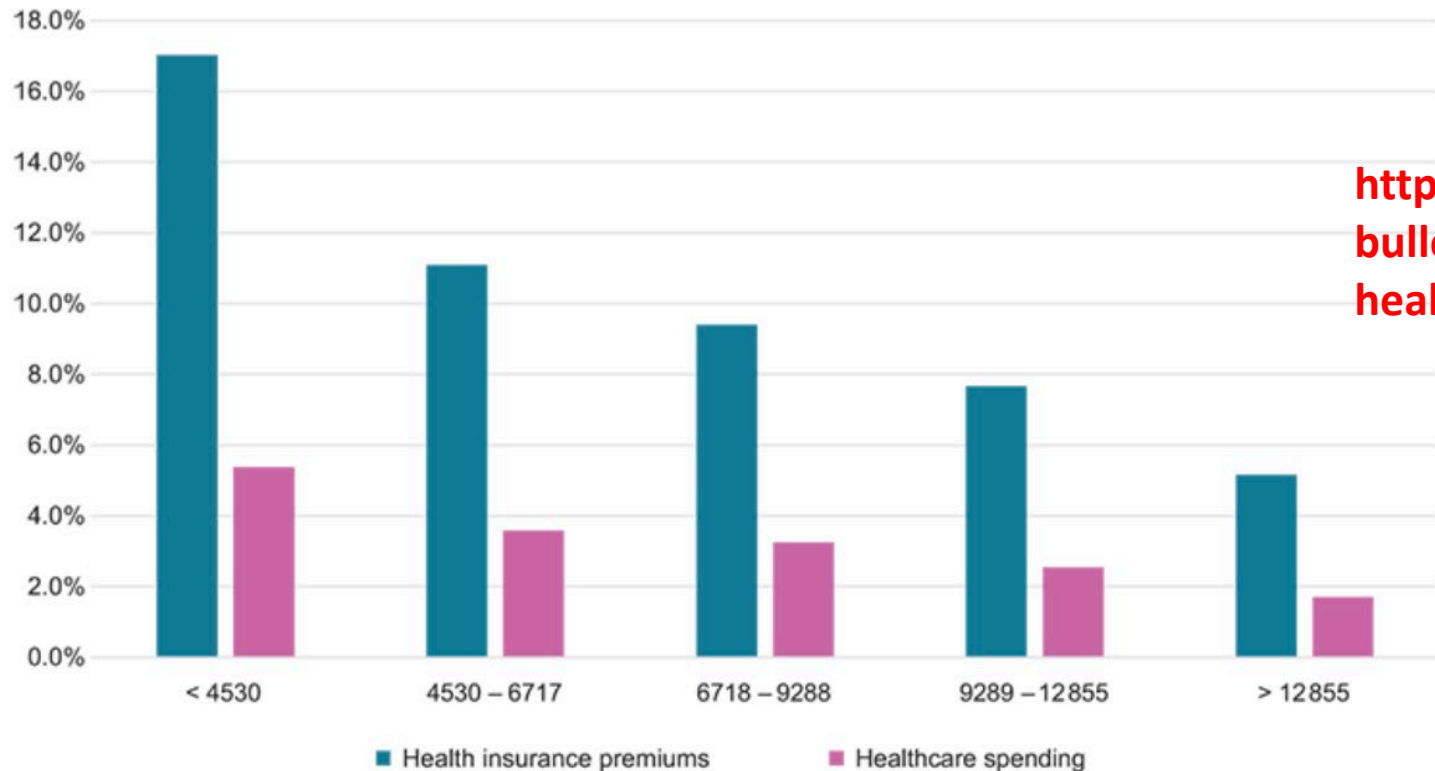
**IDF 2021**

	NovoRapid flacon 10ml 100 U/ml		Lantus 100 Unités/ml 3 ml en stylo pré rempli SoloStar - Boite de 5	
	Prix fabricant	Prix patient	Prix fabricant	Prix patient
France	€ 14.44		€ 38.16	
Suisse	€ 21.60	€ 39.82	€ 53.80	€ 76.79

# Reflections for Switzerland – Social Determinants of Health

- Poverty – 8.7% of the Swiss population is affected by income poverty
- Financial burden of healthcare larger impact on poorer populations

G 8: Spending as a share of gross income



<https://kof.ethz.ch/en/news-and-events/kof-bulletin/kof-bulletin/2022/04/rising-cost-healthcare.html>

# Reflections for Switzerland – Social Determinants of Health

## WHO COMMISSION ON SDOH FRAMEWORK



Socioeconomic Context and Political Context	Socioeconomic Position	Material Circumstances	Social Context	Health Care
<ul style="list-style-type: none"> <li>Governance</li> <li>Macroeconomic policies</li> <li>Social policies (Labor, housing, land)</li> <li>Public policies (Education, health, social protection)</li> <li>Culture and societal values</li> </ul>	Social class	Housing and neighborhood quality	Social cohesion	Access
	Gender			Consumption potential (means to buy healthy food, warm clothes)
	Ethnicity (Racism)	Education	Physical work environment	Social capital
Occupation	Income			

*Policy interventions, population-level intervention*



Hill-Briggs, 2023





# Reflections for Switzerland – Social Determinants of Health

PL 12811-A

2/31

## Projet de loi constitutionnelle (12811-A)

modifiant la Constitution de la République et canton de Genève (Cst-GE)  
(A 2 00) (*Droit à l'alimentation*)

Le GRAND CONSEIL de la République et canton de Genève  
décrète ce qui suit :

### Article unique Modification

La constitution de la République et canton de Genève, du 14 octobre 2012, est  
modifiée comme suit :

#### **Art. 38A Droit à l'alimentation**

Le droit à l'alimentation est garanti. Toute personne a droit à une alimentation  
adéquate, ainsi que d'être à l'abri de la faim.

<https://ge.ch/grandconseil/data/texte/PL12811A.pdf>

## Opération Papyrus



L'opération Papyrus a pris fin le 31 décembre 2018.

Le canton de Genève apporte une réponse pragmatique, globale et novatrice à la situation personnelle et professionnelle des étrangers sans papiers. En proposant la normalisation de plusieurs centaines de personnes, le canton assume ses responsabilités en matière de lutte contre la sous-enchère salariale et le travail au noir et son devoir de protection des personnes en situation irrégulière particulièrement exposées à toutes formes d'abus.

<https://www.ge.ch/dossier/operation-papyrus>

# Reflections for Switzerland – Social Determinants of Health

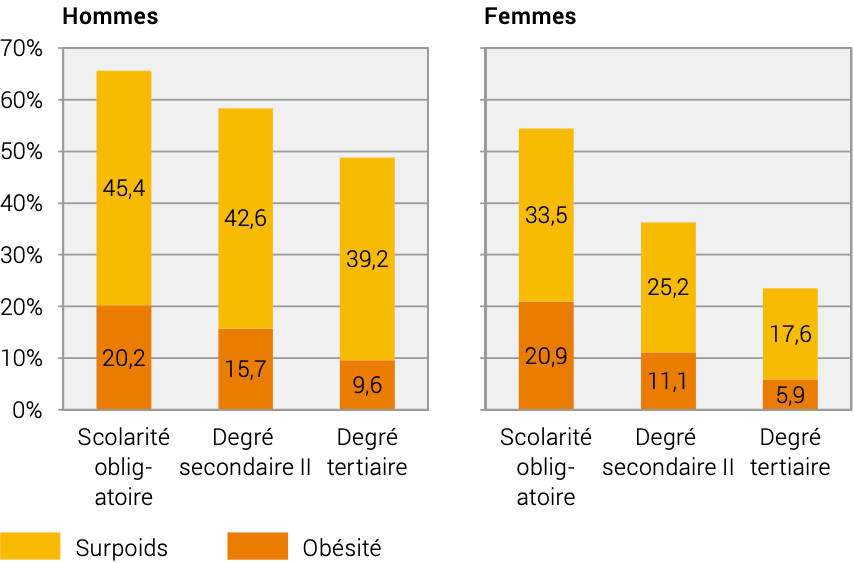
- Socioeconomic variations in diabetes prevalence ([de Mestral et al. 2020](#))
- “People with diabetes eat less simple carbohydrates, but do not comply with current advice on fish, nuts, fruits and vegetables. Improvement of the dietary intake in persons with diabetes in Switzerland is needed.” ([Marques-Vidal et al. 2017](#))
  - Adapted recommendations
  - Affordable options
- Vulnerable populations
  - Similar outcomes in insured and uninsured people with diabetes ([Jackson et al. 2016](#))

# Reflections for Switzerland – Social Determinants of Health

## Surpoids et obésité selon le niveau de formation, en 2017

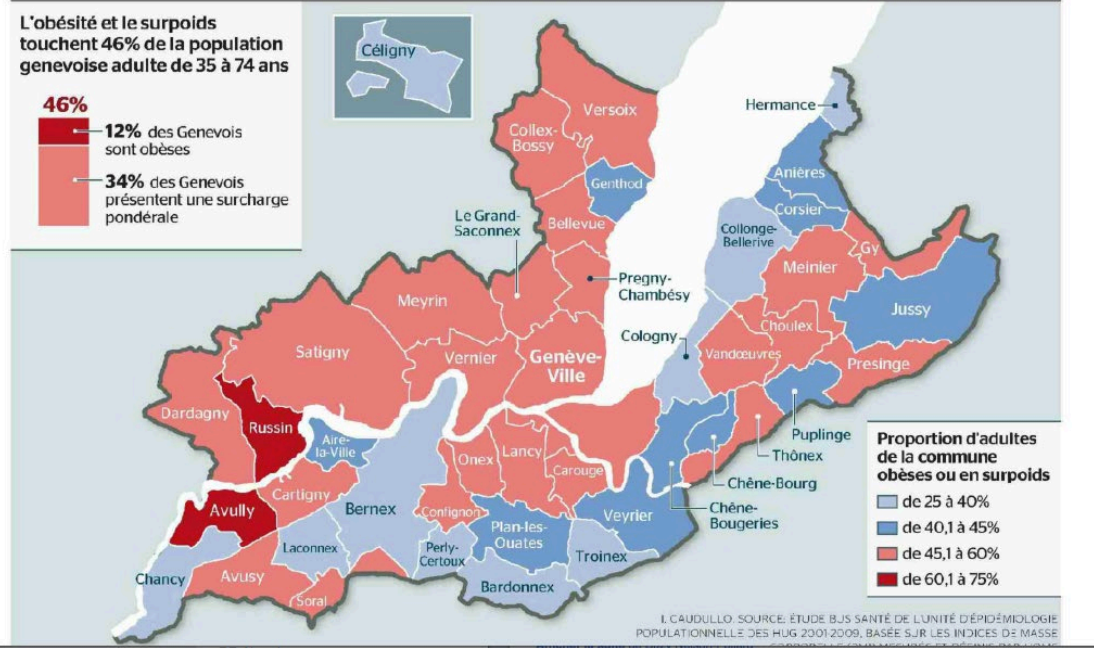
Population de 25 ans et plus vivant en ménage privé

G4



Office fédéral de la statistique 2020

Tribune de Genève 2017



Tribune de Genève 2014

## Une étude américaine place la Suisse dans le top des pays les moins «paresseux»

Une enquête de Stanford établit le lien entre taux d'activité et obésité. La Suisse fait figure de très bon élève

Les Suisses sont-ils des fainéants? Bien au contraire, indique une étude publiée cette semaine par l'Université américaine de Stanford, qui établit le lien entre taux d'activité physique et obésité. Leur recherche se base sur un critère étonnant: le nombre de pas comptabilisés par un smartphone! Pour cela, les scientifiques ont analysés les données de 717 527 personnes dans 111 pays sur une période de trois mois. Les champions incontestés sont les habitants de



La Suisse affiche une moyenne située entre 5500 et 6000 pas par jour. Et se retrouve seizième du classement mondial.

Hongkong, avec environ 6880 pas par jour. La Suisse n'est pas loin derrière avec une moyenne située entre 5500 et 6000 pas par jour. Et se retrouve seizième du classement mondial. Parmi les mauvais élèves, l'Indonésie et l'Arabie saoudite, avec moins de 3500 pas par jour.

En dehors de l'aspect quantitatif de l'étude, les auteurs pointent d'autres éléments cruciaux. Au final, ce n'est pas le nombre de pas qui compte mais «l'inégalité des activités»: la différence entre les plus «actifs» et les plus «paresseux» se surimpose à l'inégalité de richesse. Plus l'inégalité d'activité est importante, plus le taux d'obésité est élevé. «La Suède montre l'un des plus petits écarts entre l'activité des personnes riches et celle des personnes pauvres. Elle révèle aussi l'un des taux d'obésité les plus bas», explique Tim Althoff, l'un des auteurs de l'étude. Autre indication surprenante: l'inégalité d'activité peut être expliquée par la différence entre les femmes et les hommes.

Dans les pays à faible inégalité et faible taux d'obésité, hommes et femmes sont actifs à des degrés similaires. Mais dans les pays à forte inégalité, les femmes sont moins souvent actives. Par exemple, en Arabie saoudite, les femmes restent plus souvent à la maison, travaillent et sortent moins que les hommes. Ceci se répercute sur le taux d'obésité. «L'activité des femmes diminue de manière plus spectaculaire que chez les hommes, indique Jure Leskovec, autre membre de l'équipe. Quand l'inégalité d'activité est plus élevée, c'est souvent l'activité physique des femmes qui diminue drastiquement. Du coup, l'obésité est plus susceptible de toucher les femmes.»

Comment remédier à un manque d'activité et contribuer à la lutte contre l'obésité? En concevant plus de villes piétonnes, répondent les chercheurs. En comparant plusieurs villes américaines, l'équipe a découvert que des villes plus adaptées aux piétons, comme New York ou San Francisco, ont une aptitude à la marche plus élevée et un taux d'obésité plus bas. Sarah Jelassi

# Reflections for Switzerland – Social Determinants of Health

## Health of undocumented migrants in primary care in Switzerland

Yves Jackson <sup>1 2</sup>, Adeline Paignon <sup>3</sup>, Hans Wolff <sup>4</sup>, Noelia Delicado <sup>3</sup>

**Conclusions:** Undocumented migrants present multiple health problems in primary care settings and bear an important burden of chronic diseases. The extent of multimorbidity highlights the need to provide and facilitate the access to comprehensive and long-term primary healthcare services.



**RTS 2023**

"L'avis d'ici": les Suisses et les Suissesses partagent leurs préoccupations

**ELECTIONS FÉDÉRALES 2023**

À 16h57

- **Santé**  
Hausse des coûts et manque de personnel soignant
- **Défis du quotidien**  
Concilier travail et famille
- **Social**  
La rémunération des proches aidants

## Pénurie de professionnels de la santé: pour améliorer l'accès aux soins de base, le Valais lance un plan d'action

Le canton dévoile un plan directeur pour répondre à la pénurie médicale et garantir un meilleur accès aux soins de base. La démarche entend réunir les acteurs du système de santé autour de projets concrets.

**Le Nouvelliste 2023**

## Un tiers de la population suisse est victime de violence ou de discrimination

Un tiers de la population résidant en Suisse déclare avoir été victime de discrimination ou de violence, le plus souvent pour des motifs racistes, relève la dernière enquête sur le «vivre ensemble en Suisse», menée par l'Office fédéral de la statistique

**Le Temps 2023**

# Personal reflections for Switzerland

## WHO COMMISSION ON SDOH FRAMEWORK



Socioeconomic Context and Political Context	Socioeconomic Position	Material Circumstances	Social Context	Health Care
<ul style="list-style-type: none"> <li>Governance</li> <li>Macroeconomic policies</li> <li>Social policies (Labor, housing, land)</li> <li>Public policies (Education, health, social protection)</li> <li>Culture and societal values</li> </ul>	<ul style="list-style-type: none"> <li>Social class</li> <li>Gender</li> <li>Ethnicity (Racism)</li> <li>Education</li> <li>Occupation</li> <li>Income</li> </ul>	<ul style="list-style-type: none"> <li>Housing and neighborhood quality</li> <li>Consumption potential (means to buy healthy food, warm clothes)</li> <li>Physical work environment</li> </ul>	<ul style="list-style-type: none"> <li>Social cohesion</li> <li>Social capital</li> </ul>	<ul style="list-style-type: none"> <li>Access</li> <li>Affordability</li> <li>Quality</li> </ul>

Policy interventions, population-level intervention



Hill-Briggs, 2023

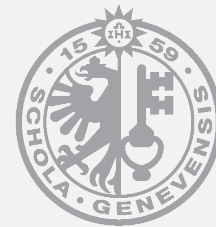


Any questions or comments?

David.Beran@unige.ch



Hôpitaux  
Universitaires  
Genève



**UNIVERSITÉ  
DE GENÈVE**

**FACULTÉ DE MÉDECINE**