10-YEAR TREND IN SOCIO-ECONOMIC INEQUALITIES IN THE PREVALENCE AND INCIDENCE OF PHARMACOLOGICALLY-TREATED TYPE 2 DIABETES IN FRANCE – 2010-2020

M. Guion[1] , L. Mandereau-Bruno[2] , S. Goria[2], E. Cosson[3] , S. Fosse-Edorh[4]

[1] Department of Non-Communicable Diseases and Trauma, Santé Publique France, Saint-Maurice, France; Paris 13 University, Nutritional Epidemiology Research Team (EREN), Bobigny, France.

[2] Data science division, Santé Publique France, Saint-Maurice, France.

[3] Department of Endocrinology-Diabetology-Nutrition, Avicenne Hospital, University of Paris 13, Sorbonne Paris Cité, CRNH-IdF, CINFO, AP-HP, 93000 Bobigny, France; Sorbonne Paris Cité, UMR U1153 INSERM / U1125 INRA / CNAM / University Paris 13, 93000 Bobigny, France.

[4] Department of Non-Communicable Diseases and Trauma, Santé Publique France, Saint-Maurice, France.

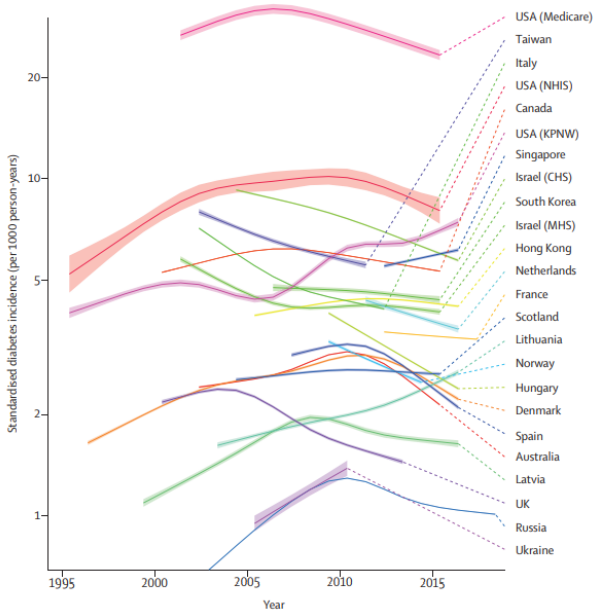
3 december 2022

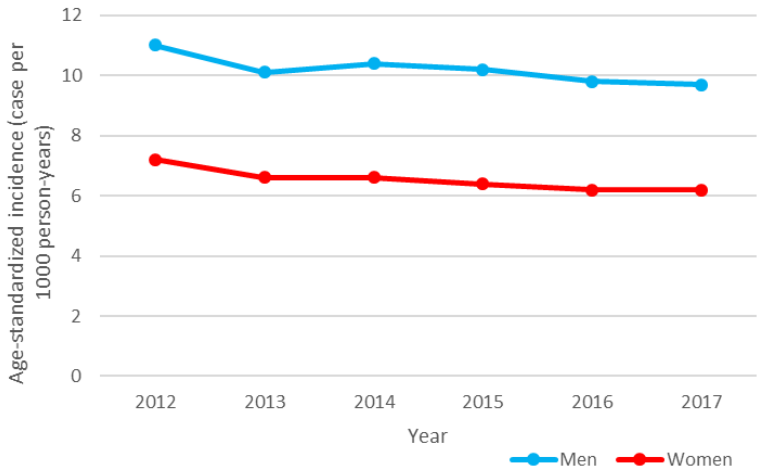
No conflict of interest

BACKGROUND

EVIDENCE BEFORE THIS STUDY

- ✓ Diabetes burden is increasing worldwide and causes many complications
- ✓ In recent years, the incidence of diabetes seems to have stabilized or even decreased in many countries
  - ➢ Worldwide *(Magliano DJ, et al., 2021)*
  - ➢ France *(Fuentes S, et al., 2020)*





X We don't know if the observed change in incidence concerns the different socio-economic groups of the French population

Magliano DJ, et al. *The Lancet Diabetes & Endocrinology*. 2021;**9**:203–11; Fuentes S, et al., *Diabetes Metab*. 2020;**46**:472–79

BACKGROUND

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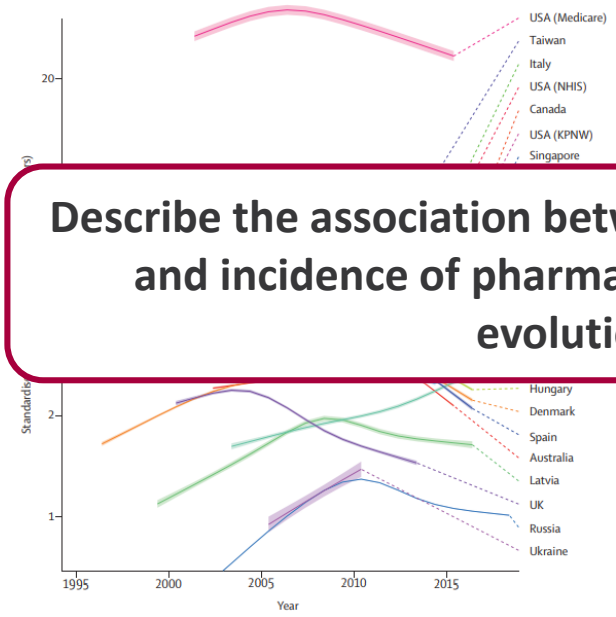
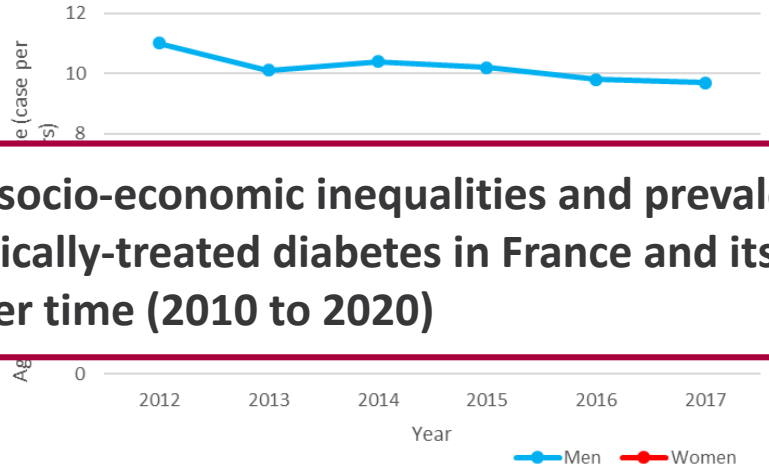




AIM

Describe the association between socio-economic inequalities and prevalence and incidence of pharmacologically-treated diabetes in France and its evolution over time (2010 to 2020)

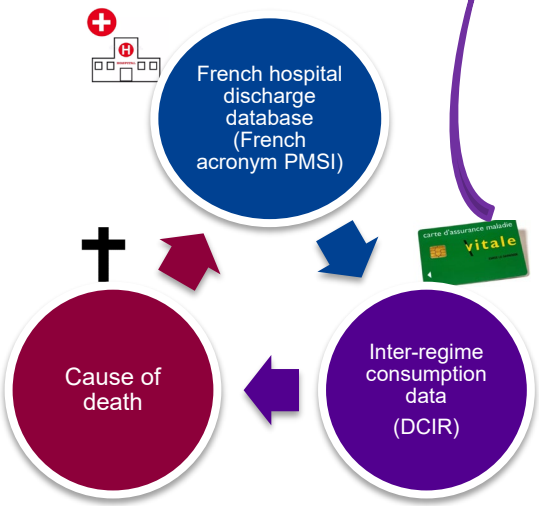
X We don't know if the observed change in incidence concerns the different socio-economic groups of the French population

Magliano DJ, et al. *The Lancet Diabetes & Endocrinology*. 2021;**9**:203–11; Fuentes S, et al., *Diabetes Metab*. 2020;**46**:472–79

METHODS

Database

SNDS
Système national des données de santé
French national health data system



Study population

- **DCIR :** at least one care reimbursement in the year
- **99% of the French population → consumers used as denominator**

Identification of diabetes

- **Validated algorithm to identify pharmacologically-treated people with diabetes**
- *(Fuentes, S., et al., 2019)*

Definition:

3 reimbursements for anti-diabetic treatment in a calendar year

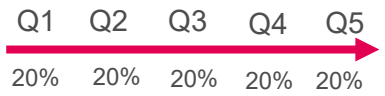
Measuring socio-economic inequalities

- **French deprivation index : FDep 2015 version** *(Rey G. et al., 2009)*

Definition:

> Measured at the municipalities of residence of people living in **metropolitan France**
> Variables :
- Rate **unemployment**
- Rate of **workers**
- Rate of **graduates**
- Median tax **income** per CU

> Population quintiles



People living in the less deprived municipalities

People living in the most deprived municipalities

CU: Consumption Unit

Fuentes, S., et al., Int J Public Health, 2019. 64(3): p. 441-450 ; Rey G, et al., BMC Public Health. 2009;9:33

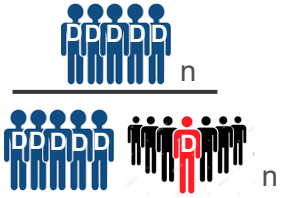
METHODS

Definitions of prevalence and incidence of diabetes

Consummers with diabetes | Consummers without diabetes | Consummers with new diabetes

➢ **Prevalent case :**

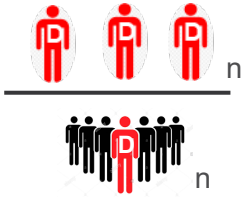
➢ **Prevalence :**



➢ **Incident case :**

➢ **Population at risk :**

➢ **Incidence :**



Standard population

➢ **Standardisation on the European reference population 2013** *(Pace M. et al., 2013)*

>**Age-standardised prevalence** and **incidence** rates stratified by **sex**

Restriction of analyses

➢ **people aged 45 years and over**

>More specific to **type 2 diabetes**

Temporal trends

➢ **Quasi-poisson regression**

>**Variables of interest:**
Model 1 number of prevalent cases
Model 2 number of incident cases

>**Independent variables:**
Models 1 and 2: calendar year, age (spline), department of residence and FDep quintile (reference: less deprived Q1)

>**Offset:**
Model 1 log population (prevalence)
Model 2 log population at risk (incidence)

>**Interaction:**
Calendar year and FDep quintiles

RESULTS

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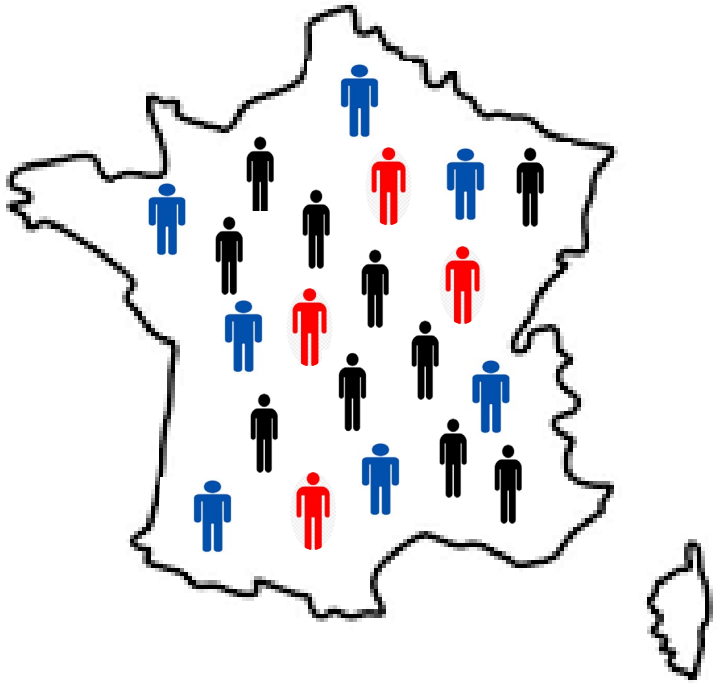
2020 study population ≥ 45 years :

Consumers : 29,772,928

Prevalent cases : 3,081,938

Incident cases : 214,654



RESULTS

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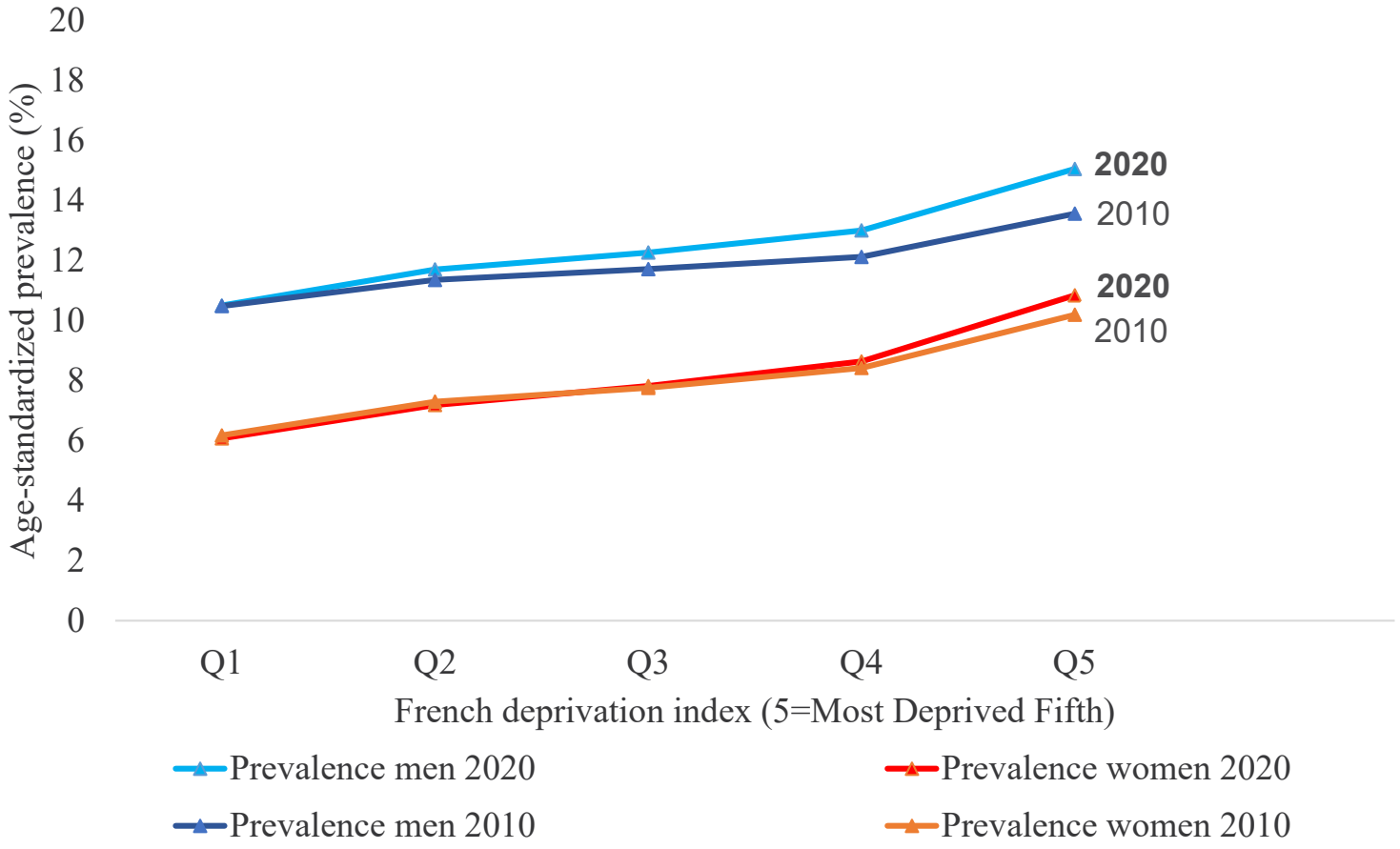
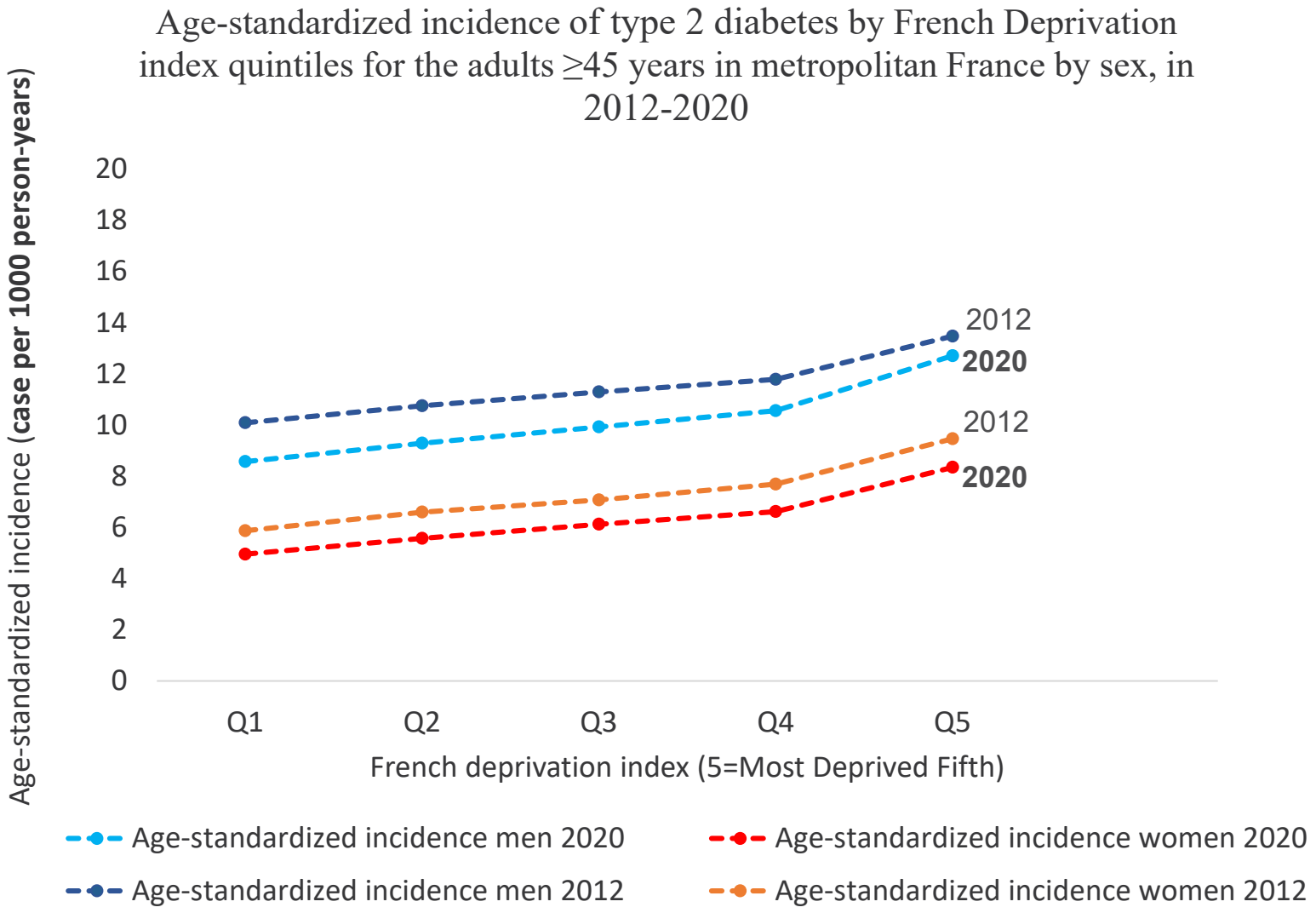
Age-standardized prevalence of type 2 diabetes by French Deprivation index quintiles for the adults ≥45 years in metropolitan France by sex, in 2010-2020



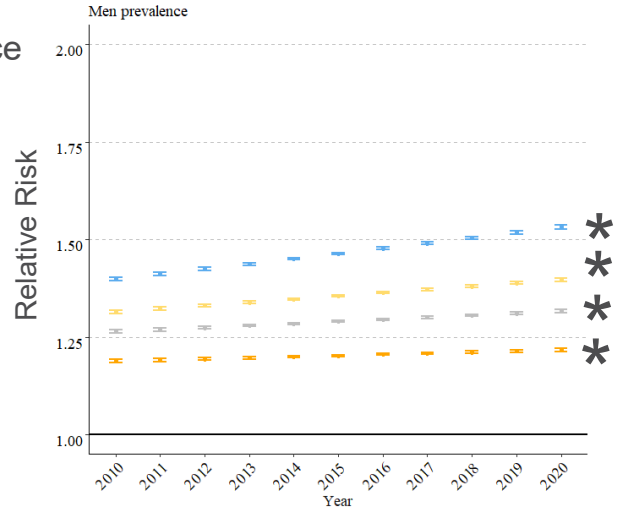
RESULTS


Age-standardized incidence of type 2 diabetes by French Deprivation index quintiles for the adults ≥45 years in metropolitan France by sex, in 2012-2020
Age-standardized incidence (case per 1000 person-years)
20
18
16
14
12
10
8
6
4
2
0
2012
2020
2012
2020
Q1
Q2
Q3
Q4
Q5
French deprivation index (5=Most Deprived Fifth)
Age-standardized incidence men 2020
Age-standardized incidence women 2020
Age-standardized incidence men 2012
Age-standardized incidence women 2012

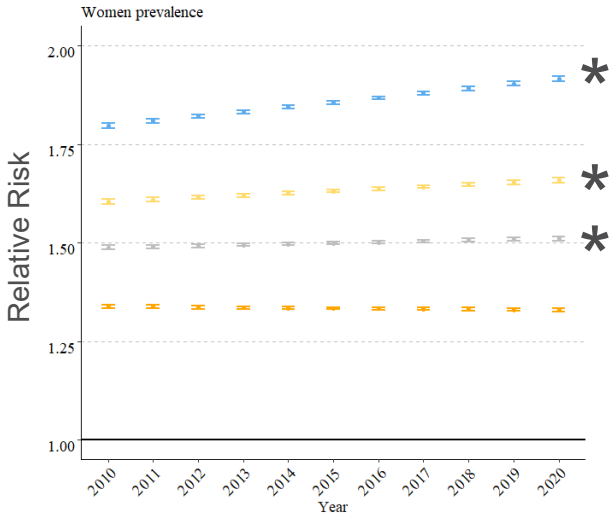
RESULTS

Trends over time in relative risks (RR) of prevalence and incidence of type 2 diabetes by deprived in men and women (reference : less deprived Q1)

Men prevalence



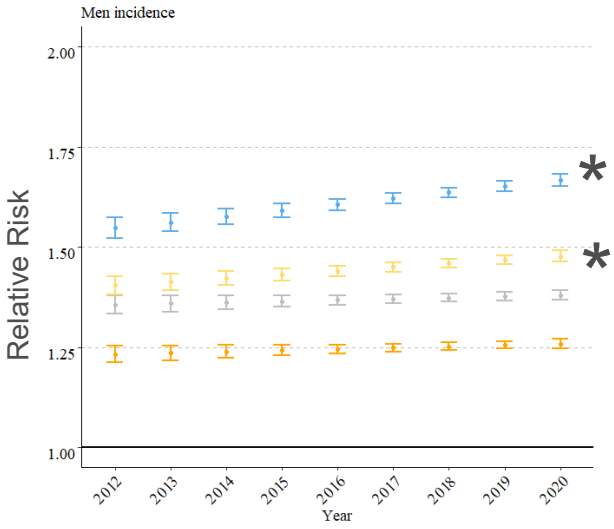
Women prevalence



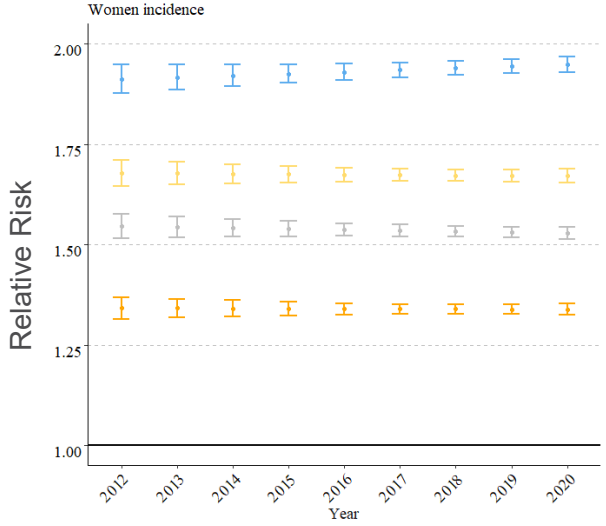
* *P*Trends<0,05

Q5
Q4
Q3
Q2
Q1

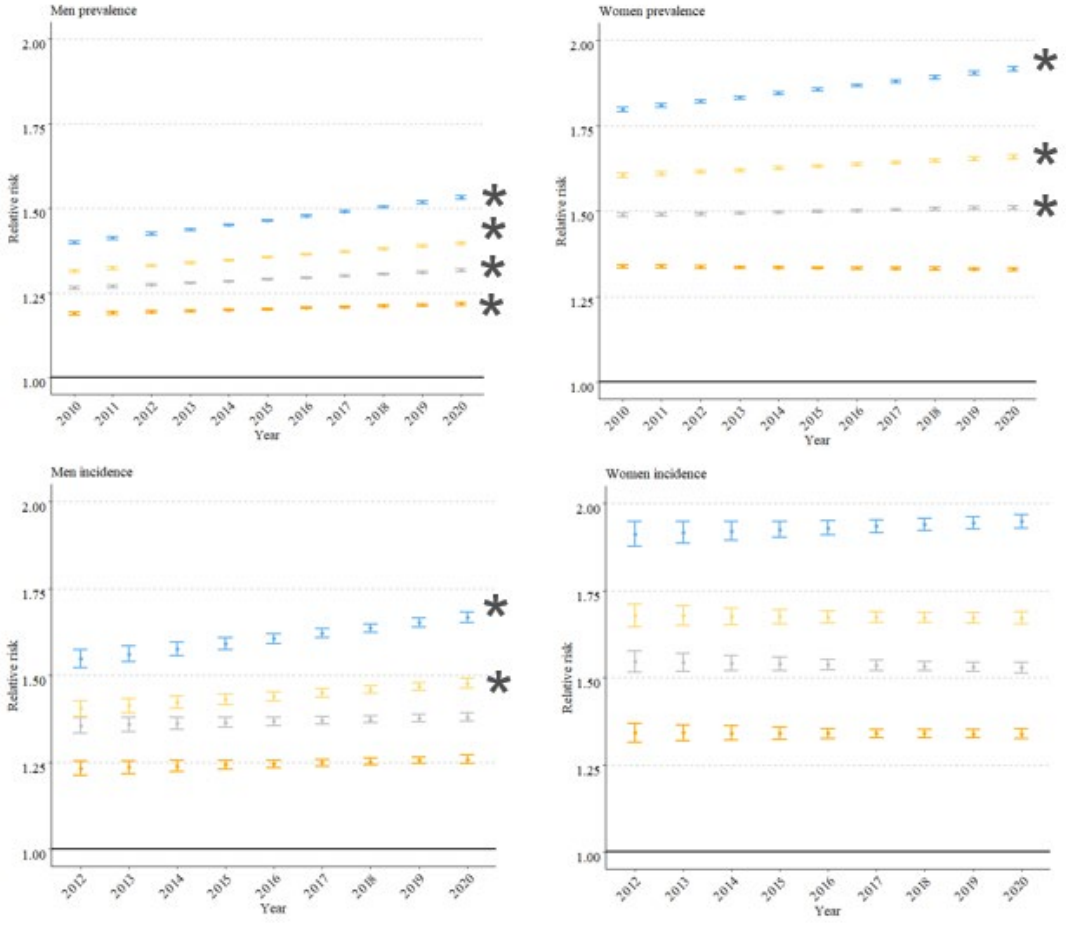
Men incidence



Women incidence



CONCLUSION



- **Social deprived gradient**
  - **The influence of socio-economic inequalities increases** over time for the **prevalence** in **men** and **women**
  - **The influence of socio-economic inequalities increases** over time for the **incidence** in **men**
  - **The influence of socio-economic inequalities has stabilized** over time for the **incidence** in **women** in France
- **Efforts to reduce socio-economic inequalities** must continue
- **Prevention actions** targeted at **municipalities** where the **most at-risk populations live**

DISCUSSION

X **In Europe,** few recent studies have analyzed the **influence of evolution of socio-economic inequalities** in the **prevalence** and **incidence** of **diabetes**

- **European studies** show that there is an **increase** in **socio-economic inequalities** in the **prevalence** of diabetes *(Scholes S. et al., 2012; de Mestral C, et al., 2020; Wang J., et al., 2022)*

- **Fewer studies in Europe** on the **evolution** of **incidence** according to **socio-economic inequalities** → Studies show either an **increase** in **socio-economic inequalities** or a **stabilization** *(Read SH., et al., 2016; Matthew B.et al., 2022 PREPRINT; Abouzeid M, et al., 2015)*

✓ Our study **completes** the missing **information in France** on the **evolution** of the **prevalence** and **incidence** of diabetes according to **socio-economic inequalities** in diabetes over time and **in Europe**

Scholes S, et al., BMC Public Health. ; de Mestral C, et al., BMJ Open Diabetes Res Care. 2020, 8(1):e001273 ; Wang J., et al., Epidemiol Community Health. 2022;76:482-484; Abouzeid M, et al., Eur J Epidemiol. 2015 30(8):649-59; 2012 14;12:129; Read SH., et la., Diabetologia. 2016 Oct;59(10):2106-13;; Matthew B., et al., 2022, PREPRINT (Version 1) available at Research Square

Thank you for your attention!

Fondation de France

Thanks to the Fondation de France for the financing of my thesis

ABSTRACT

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10-YEAR TREND IN SOCIO-ECONOMIC INEQUALITIES IN THE PREVALENCE AND INCIDENCE OF PHARMACOLOGICALLY-TREATED TYPE 2 DIABETES IN FRANCE – 2010-2020

Marie Guion[1], Laurence Mandereau-Bruno[2], Sarah Goria[2], Emmanuel Cosson[3], Sandrine Fosse-Edorh[1]

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Background : The aim was to describe the association between social inequalities and the prevalence/incidence of pharmacologically-treated type 2 diabetes (T2D) in France over the 2010-2020 period.

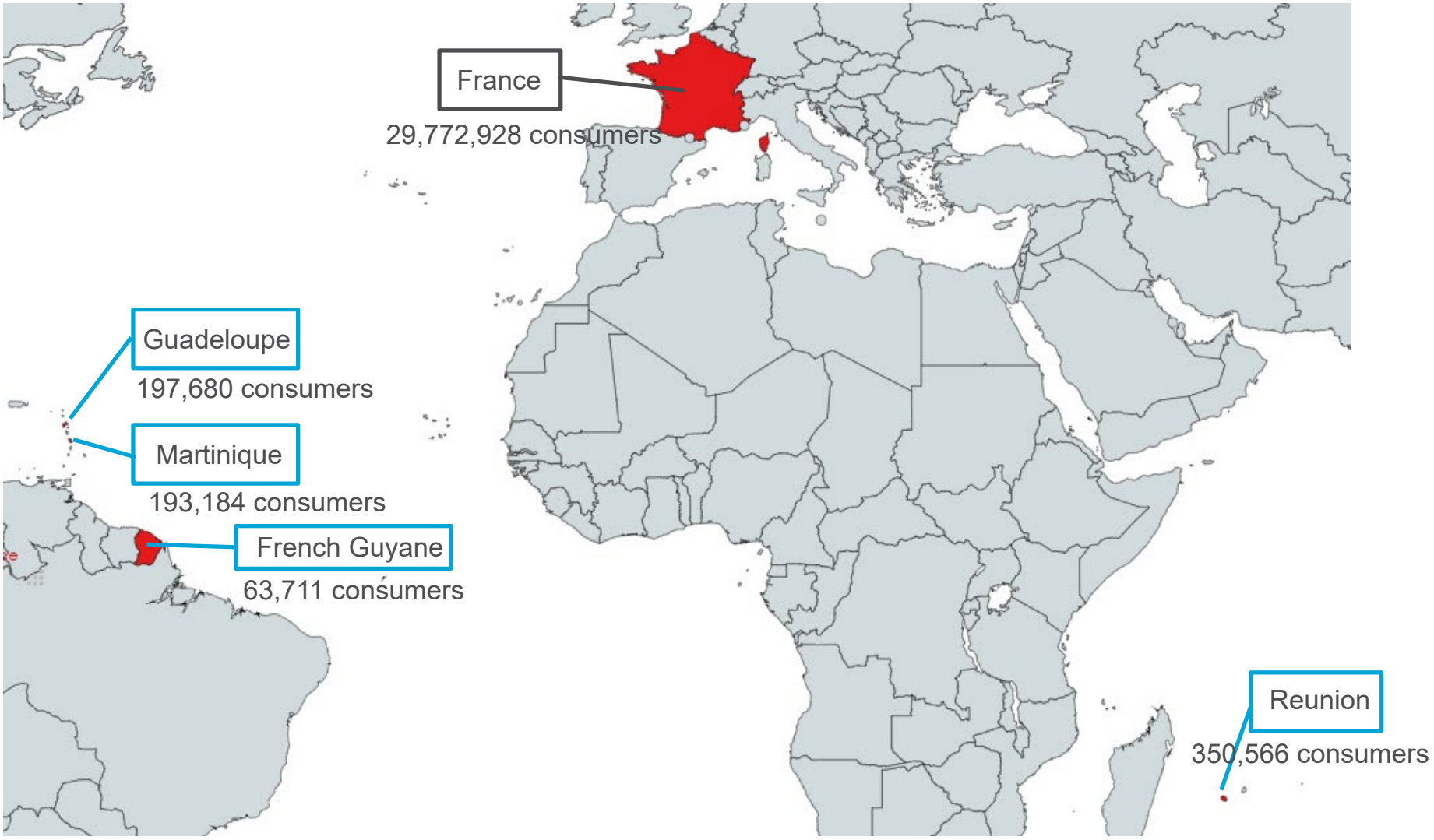
Methods : Diabetes cases were identified using a validated algorithm in the French national health data system. Analyses were restricted to adults ≥45 years to focus analyses on T2D. Social inequalities were measured, each year, via the French Deprivation index (FDep) for metropolitan France. Individuals living in the French overseas territories (FOT) were considered in separately group. Age-standardized (2013 European standard population) prevalence and incidence rates were stratified by sex. Denominators were French health consumers (from 24,229,236 in 2010 to 29,772,952 in 2020).

Results: Age-standardized T2D prevalence and incidence were higher in most deprived quintiles Q5 compared to the less deprived Q1 in metropolitan France and was even higher in the FOT, for both genders. Q5/Q1 ratio of prevalence and incidence at the beginning of the period for men (1.3 and 1.3 respectively) and women (1.7 and 1.6) increased during the period. In 2020, they met respectively 1.4 and 1.5 for men and 1.8 and 1.7 for women.

Conclusion: Social inequalities are positively associated with the prevalence/incidence of pharmacologically-treated T2D in metropolitan France. The association is stronger in women than in men and has increased during the 2010-2020 period. These results will be confirmed using a multivariate model.

Keywords : Socio-economic inequalities ; type 2 diabetes ; incidence ; prevalence ; administrative health databases

METHODS



45 years and over

France 2020
French overseas territories 2020

RESULTS

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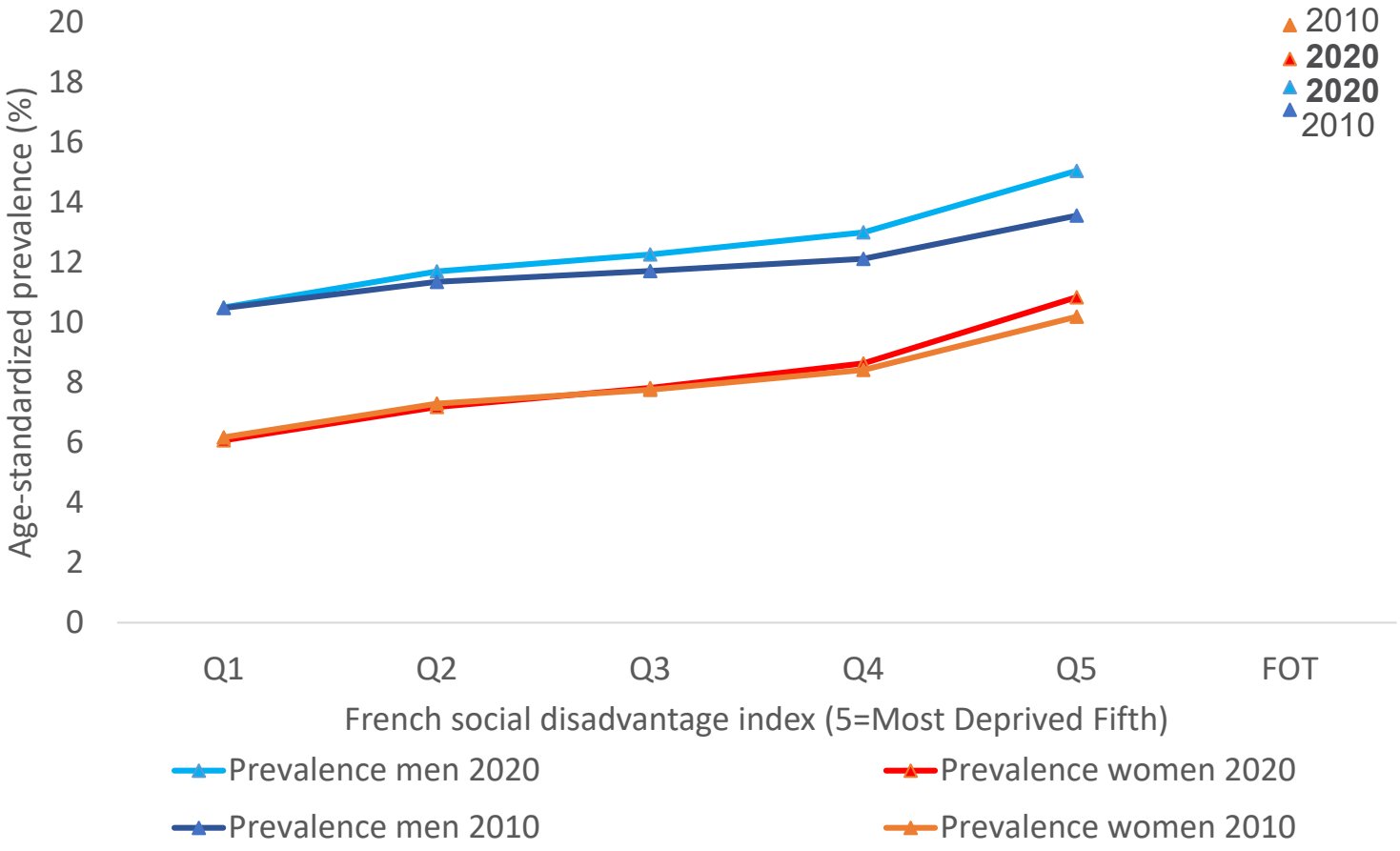
Trends in age-standardized prevalence 2010-2020 by French Deprivation index quintiles for the adults ≥45 years in metropolitan France and in French overseas territories (FOT), by sex



RESULTS

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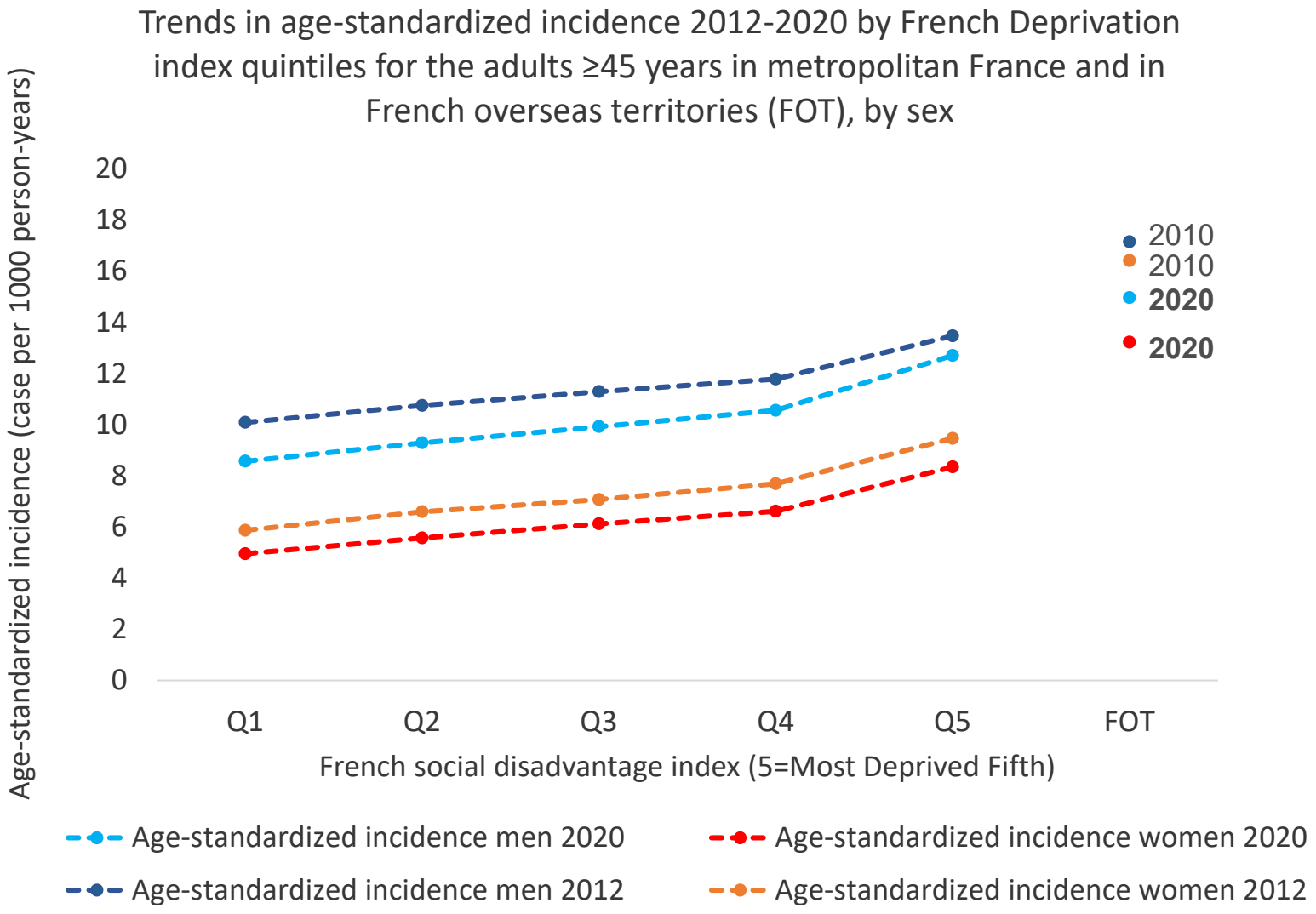
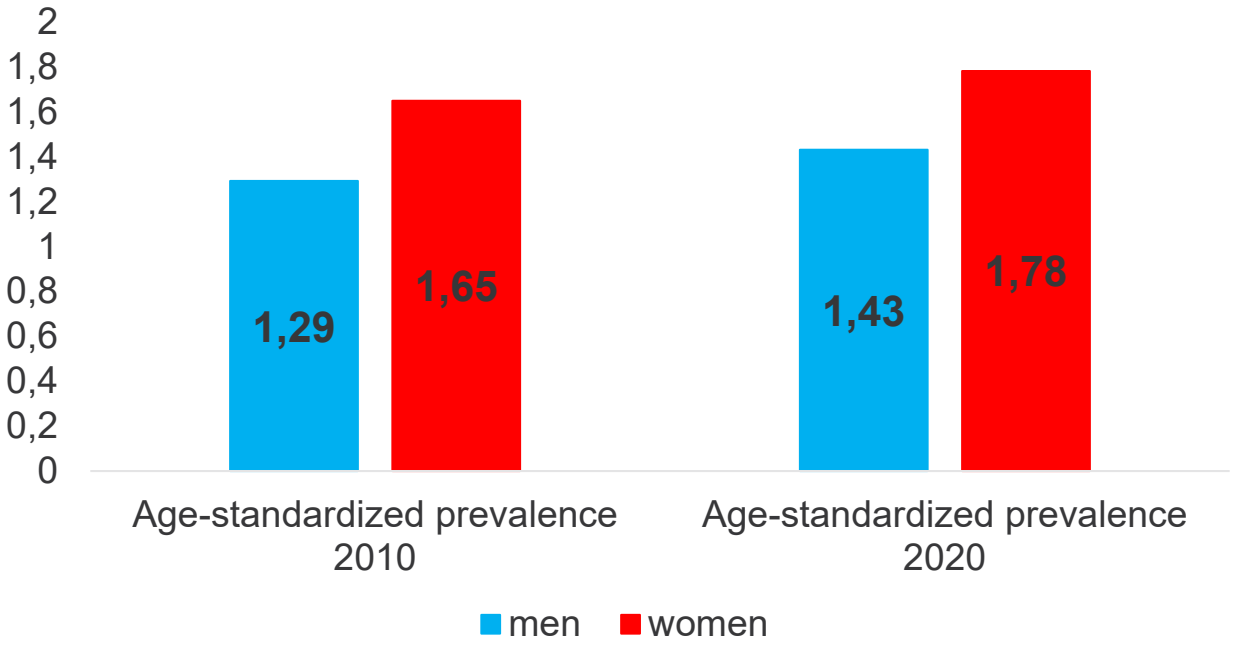


RESULTS

Age standardized prevalence ratio of people living in the most disadvantaged quintile to people living in the most advantaged quintile (Q5/Q1) for both sexes in metropolitan France in 2010 and 2020



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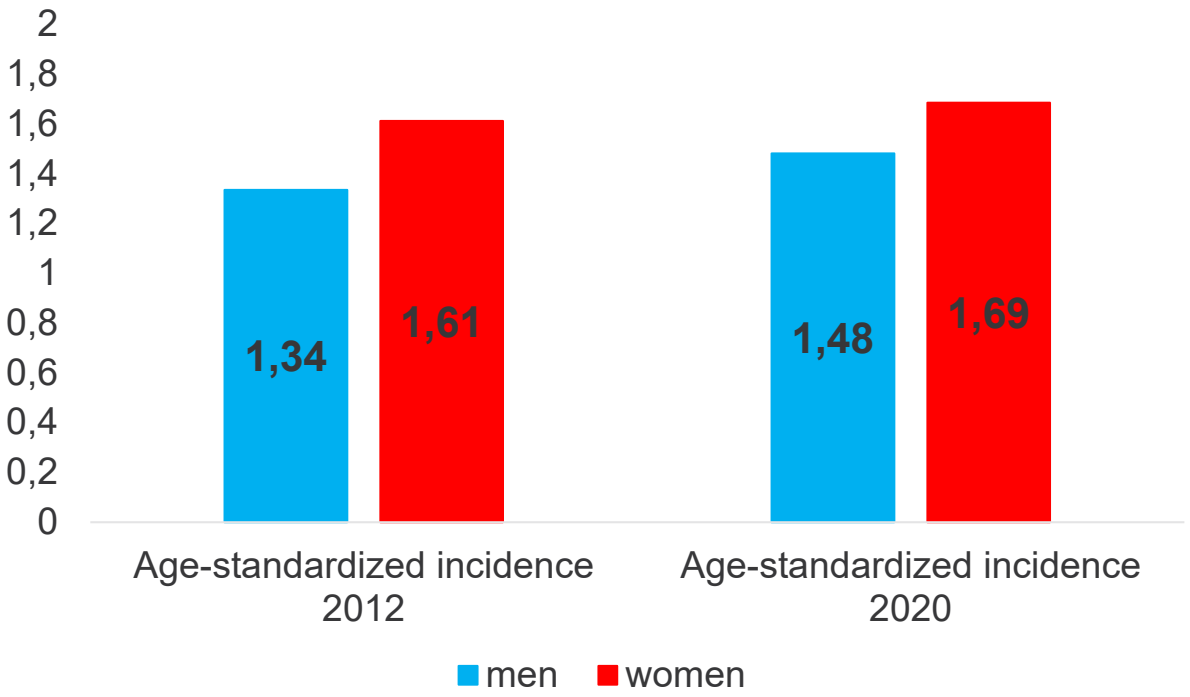
Age standardized incidence ratio of people living in the most disadvantaged quintile to people living in the most advantaged quintile (Q5/Q1) for both sexes in metropolitan France in 2012 and 2020



DISCUSSION

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Years	Sample	Measuring social inequalities in health	Influence of socio-economic inequalities on prevalence	Influence of socio-economic inequalities on incidence	Reference
1998 and 2002	Northern Ireland (3,500-4,000 peoples) and Republic of Ireland (5,000-9,000 peoples) (Repeated cross-sectional studies in national surveys)	Educational level	Northern Ireland Stable M/W Republic of Ireland Increase M Increase (NS) W	?	Hughes J, et al., 2017
1987-2006	Spanish (Spanish National Health Survey, 86,345 peoples)	Educational level	Increase (NS) M/W	**?**	Espelt A et al., 2012
1990-1992 and 2002-2005	Germany (German health surveys, 25 to 69 years)	Educational level	Increase (NS) M/W	?	Heidemann C, et al., 2009
1994, 1998, 2003, 2006	England (health survey for 1,643 people aged ≥ 35 years)	Income, professional social, educational level	Stable M Increase W	?	Imkampe AK., et al., 2011
1970-2007	Findande (serial investigations FINRISK; 18,806 men and 19,883 women)	Educational level	?	Increase (NS) M Stable W	Abouzeid M, et al., 2015
1994 - 2008	England (Health Survey for England (HSfE) repeated cross-sectional surveys of 1994-2008 approximately 14,000 adults)	Index of multiple deprivation (IDM) 2007	Increase (NS) M/W	?	Scholes S. et al., 2012
2004-2013	Scotland (180,290 people with type 2 diabetes)	Scottish Index of Multiple Deprivation (SIMD)	**?**	Increase (NS) M/W	Read SH., et al., 2016
2005-2017	Geneva (Annual cross-sectional study of adults 9,886 peoples)	Education, income and health insurance	Increase (NS) (without distinction of gender)	**?**	de Mestral C, et al., 2020
2009-2018	Catalonia, Spain (3,247,244 adults ≥40 years)	Mortalidad en áreas pequeñas españolas y desigualdades socioeconómicas y ambientales (MEDEA)	**?**	Decrease (NS) M 55-69 Decrease (NS) W 55-69	Matthew B.et al., 2022 PREPRINT
2001-2007 and 2021	Scotland (255,764 people with type 2 diabetes)	Scottish Index of Multiple Deprivation (SIMD)	Increase (NS) M/W	**?**	Wang J., et al., 2022
2010-2020	**France (255,764 people with type 2 diabetes)**	**French deprivation index (Fdep)**	Increase M/W	Increase M Stable W	**Guion M., et al, 2022**

Hughes J, et al., BMJ Open. 2017 3;7(4):e013442.; Espelt A et al., Eur J Public Health. 2012;22(6):765-71; Heidemann C, et al. (2009) Diabet Med 26(6):655-658; Imkampe AK, et al., Eur J Public Health. 2011;21(4):484-90. ; Abouzeid M, et al., Eur J Epidemiol. 2015 30(8):649-59; Scholes S, et al., BMC Public Health. 2012 14;12:129; Read SH., et la., Diabetologia. 2016 Oct;59(10):2106-13; de Mestral C, et al., BMJ Open Diabetes Res Care. 2020, 8(1):e001273; Matthew B., et al., 2022, PREPRINT (Version 1) available at Research Square; Wang J., et al., Epidemiol Community Health. 2022;76:482-484;

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Study population :

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Consummers	24,228,526	2,477,0236	25,596,839	26,002,920	26,742,206	27,754,111	28,480,027	28,926,519	29,195,268	29,355,105	29,772,928
Study population for prevalence	2,322,869	2,419,990	2,541,676	2,599,401	2,685,115	2,786,912	2,866,298	2,916,099	2,968,033	3,014,152	3,081,938
Study population for incidence	na	na	208,560	194,754	200,803	202,754	199,825	202,757	202,219	216,117	214,654

na: not applicable