

Hospitalization for Acute Heart Failure and In-Hospital Mortality Before, During, and After the COVID-19 Pandemic Period in France: A Nationwide Open Cohort Study from 2013 to 2023

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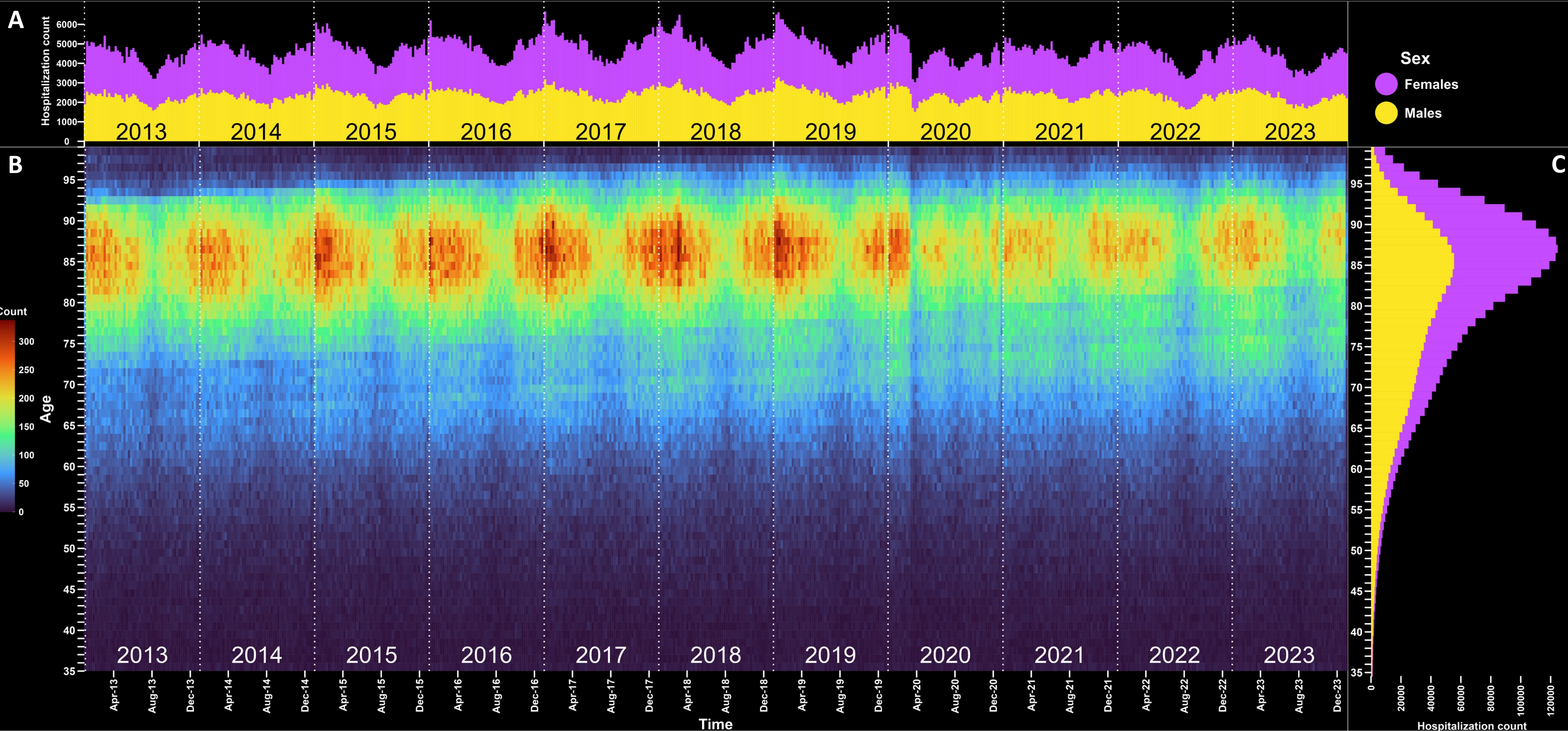
CONTEXT:

- Reorganization of healthcare pathways in 2020 due to the emergence of the COVID-19 pandemic.
- Decline in all-cause hospital admission [1].
- Decline in hospital admissions for acute heart failure (AHF) [2], despite their urgent status.

OBJECTIVE:

- To assess the impact of the COVID-19 pandemic on the management of AHF patients in France from 2020 to 2023:
 - Quantify the change in the number of AHF-related hospitalizations.
 - Quantify the change in the number of in-hospital deaths during stays for AHF.

Figure 1: Weekly Hospitalization Count by Age, and Repartition By Sex, France, 2013–2023



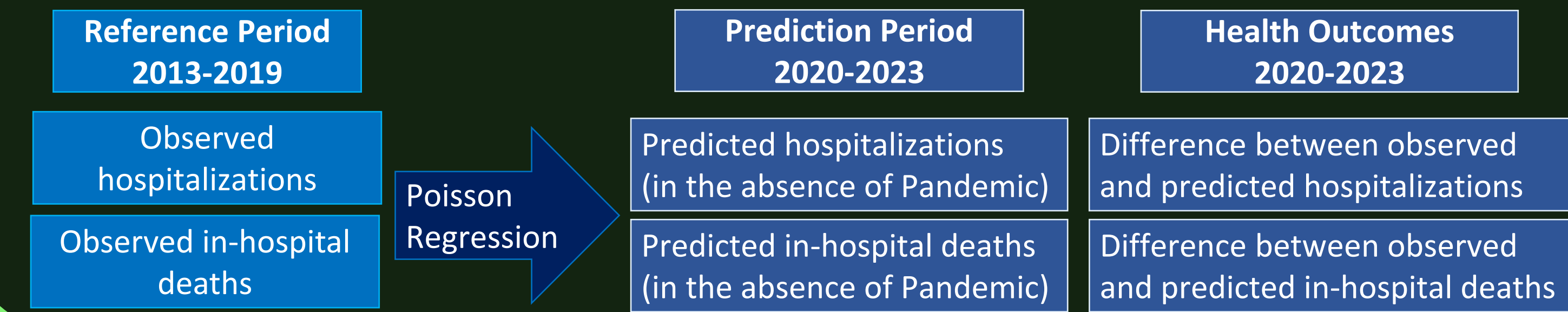
A: Weekly number of hospitalizations in France from 2013 to 2023, by sex.
B: Weekly number of hospitalizations by age. For example, in January 2019, the colour gradient is red for individuals aged between 85 and 90, corresponding to a weekly number of around 300 hospitalizations. This hospitalization peak is also visible in panel A for both males and females.
C: Cumulative number of hospitalizations by age (from 35 to 99 years old), and sex.

METHODS:

Study Population:

- 736,954,298 person-years between 2013 and 2023, analyzed using the National Health Data System (SNDS).
- 2,692,968 AHF-related hospitalizations (Figure 1).
- 226,771 in-hospital deaths during AHF-related hospitalizations.

Statistical Model & Outcomes:



RESULTS:

Decline in Hospitalizations (Figure 2):

- Continuous drop in hospitalization peaking in 2023.
- Cumulative reduction of 168,518 [167,639; 169,408] hospitalizations (-15.3%).
- Women are more concerned, with a relative risk ratio (RRR) of 1.26.

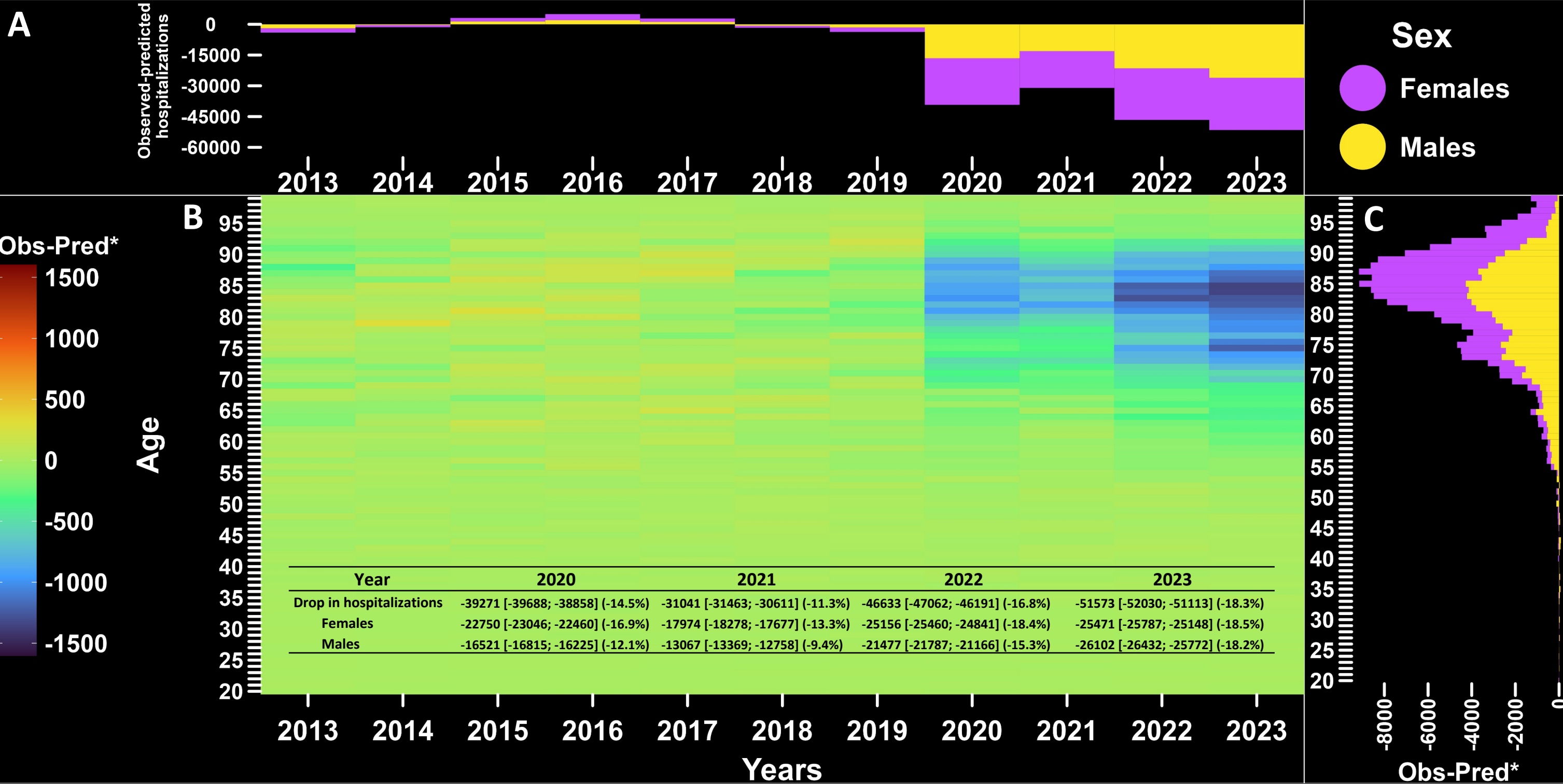
In-Hospital Excess Mortality (Figure 3):

- Systematic excess in-hospital mortality peaking in 2022.
- Cumulative toll of 6,607 [6,397; 6,818] excess deaths (+8.8%).
- Women are more concerned, with a relative risk ratio (RRR) of 1.34

Observed Disruptions and COVID-19 Pandemic Trend:

- Drop in COVID-19 mortality from 69,000 in 2020 to 14,000 in 2023 [3], while disturbances in acute heart failure healthcare pathways continue to increase.

Figure 2: Differences Between Observed and Predicted Hospitalizations



A: Annual cumulative difference between observed and predicted AHF hospitalizations (Figure 2) or between observed and predicted in-hospital deaths (Figure 3); prediction based on pre-pandemic years 2013–2019 as a reference period.
B: Annual difference between observed and predicted hospitalizations (Figure 2) or deaths (Figure 3) by exact age. For example, in 2023, in figure 2, the colour gradient is dark blue for individuals aged 85, corresponding to a difference of approximately 1,500 hospitalizations. This difference represents "missing hospitalizations," as the baseline is estimated from the pre-pandemic period and reflects the hospitalization level expected in the absence of the pandemic.
C: Cumulative difference between observed and predicted hospitalizations (Figure 2) or deaths (Figure 3) by exact age and sex from 2020 to 2023.
*Observed minus predicted

CONCLUSIONS:

- Substantial drop in AHF-related hospitalizations between 2020 and 2023 compared to the pre-pandemic period.
- Concomitant increase in in-hospital mortality over four consecutive years.
- Both patterns more concerned females.

PERSPECTIVES:

- Study the international dimension of the phenomenon in 2022 and 2023.
- Explore the potential causes of these disruptions and their amplification.
- Investigate why females are particularly concerned.

REFERENCES:

- [1] Naouri D. En 2020, le nombre de séjours hospitaliers hors Covid-19 a diminué de 13 % par rapport à 2019. 2021 (<https://drees.solidarites-sante.gouv.fr/publications/etudes-et-resultats/en-2020-le-nombre-de-sejours-hospitaliers-hors-covid-19-diminue-de>).
- [2] Khan Y, Verhaeghe N, Devleeschauwer B, et al. The impact of the COVID-19 pandemic on delayed care of cardiovascular diseases in Europe: a systematic review. Eur Heart J Qual Care Clin Outcomes 2023 9(7):647-66.
- [3] Cadillac M, Foullet A, Rivera C, Coudin E. Les causes de décès en France en 2022 : recul du Covid-19 et hausse des maladies respiratoires. 2024 (https://drees.solidarites-sante.gouv.fr/publications-communique-de-presse/etudes-et-resultats/241008_FR_les-causes-de-deces-2022).