Obesity Related Complications: Can America be Europe's Canary in the Coal Mine?

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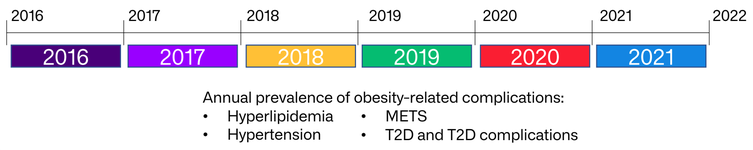
Study Summary

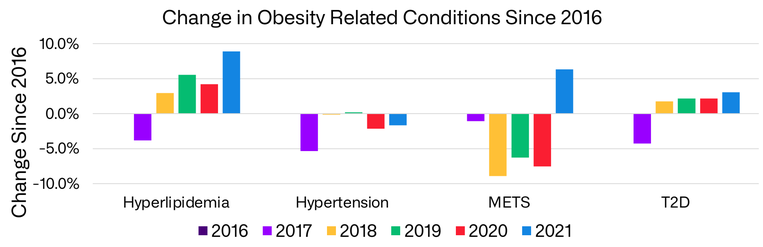
Study Question: Have increasing obesity rates lead to increased prevalence of obesity-related conditions in the United States and could that foreshadow trends in Europe?

Study Design:



Annual prevalence of obesity-related complications:
- Hyperlipidemia
- Hypertension
- METS
- T2D and T2D complications

Study Results:

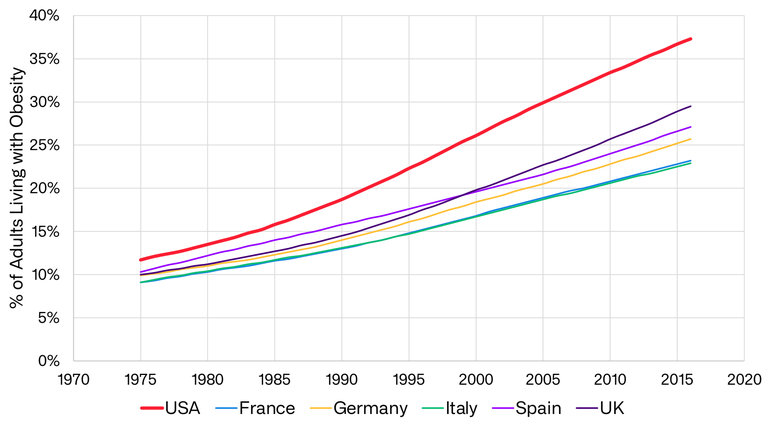


Conclusion: Slight increases in rates of hyperlipidemia and T2D were found from 2016 through 2021 suggesting that increasing rates of obesity in the US are driving increased comorbidity burden. Given that obesity trends in the EU5 are following the the US, Europe could also be at risk in the future.

Background

- The United States has had rates of obesity at least 14% higher than the EU5 since 1975 (Figure 1).
  - Further, studies suggest a continued increase, with some analyses projecting obesity rates approaching 50% in the US by 2030.[1]
  - US obesity rates have increased from 11.7% in 1975 to 37.3% in 2016 (Figure 1)
  - Rates of obesity in the EU5 have consistently lagged the US but increased from approximately 10% in 1975 to approximately 20-30% in 2016 (Figure 1)
- Obesity not only impacts patients' day to day lifestyle but is also associated with increased risk of various comorbidities including type 2 diabetes, dyslipidemia, and hypertension, as well as increased healthcare costs.[2, 3]
  - Studies have reported patients with obesity to have healthcare costs that are 42% higher than patients without obesity leading to an estimated increased spend in the United States of $40 billion.[2]

Figure 1. Obesity Rates from 1975 to 2016



Data from: World Health Organization, Global Health Observatory

Objective

- To evaluate patterns of obesity related comorbidities in the United States to provide insight into potential future trends in Europe

Methods

Data Sources

- Merative™ MarketScan® Commercial Database from January 1, 2016 through December 31, 2021
  - The MarketScan administrative claims databases contain data on the full healthcare experience (inpatient, outpatient, and outpatient pharmacy) for individuals with employer sponsored commercial or Medicare insurance in the United States

Study Design

- The study sample was composed of 6 annual cohorts (2016 to 2021) of patients with continuous medical and pharmacy benefits during the full calendar year.
- Within each calendar year cohort, the prevalence of type 2 diabetes (T2D), hypertension, hyperlipidemia, and metabolic syndrome (METS) was assessed based on ICD-10 diagnosis codes in the data
  - Further, the prevalence of T2D related complications (cardiovascular disease [CVD], cerebrovascular disease, metabolic disorders, nephropathy, neuropathy, peripheral vascular disease [PVD], and retinopathy) were examined among the T2D population on an annual basis.

Results

Annual Cohorts and Prevalence of Conditions

- The annual cohorts included 16 million to 23 million patients per year (Table 1).
  - Sex distributions were roughly equal and the majority of each annual sample (~75%) was aged ≥20 years
- Of the obesity related conditions assessed, hypertension and hyperlipidemia were the most common, followed by T2D and METS (Table 1)
  - There were a slight increases in the prevalence of hyperlipidemia and T2D from 2016 to 2021 (Table 1 and Summary Figure)
  - Increasing prevalence of disease was more common among patients aged ≥20 years of age
  - Increased prevalence of hyperlipidemia were also observed among patients aged <12 years and 12-19 years

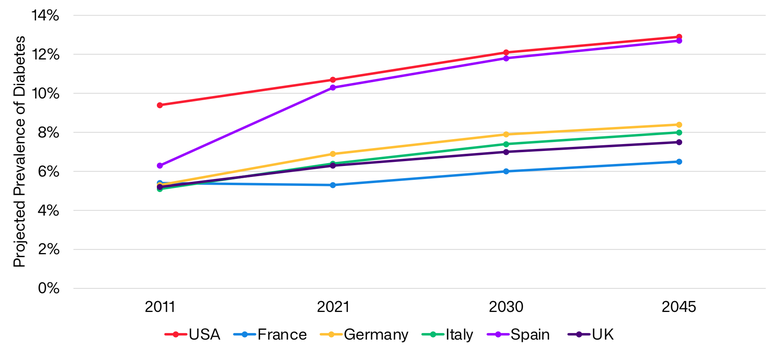
Table 1. Annual Cohorts from 2016 to 2021

	2016	2017	2018	2019	2020	2021
N	23,566,228	21,268,702	20,113,668	18,792,772	18,006,690	16,460,399
Male	48.1%	48.4%	48.4%	48.3%	48.4%	48.5%
<12 years	13.5%	13.7%	13.4%	13.5%	13.4%	13.4%
12-19 years	11.5%	11.7%	11.5%	11.6%	11.5%	11.6%
≥20 years	75.0%	74.6%	75.1%	75.0%	75.1%	75.1%
Hyperlipidemia	16.8%	16.1%	17.3%	17.7%	17.5%	18.2%
<12 years	0.25%	0.25%	0.28%	0.30%	0.32%	0.34%
12-19 years	0.73%	0.78%	0.83%	0.93%	0.99%	1.17%
≥20 years	22.2%	21.4%	22.8%	23.4%	23.1%	24.1%
Hypertension	18.8%	17.8%	18.7%	18.8%	18.4%	18.5%
<12 years	0.11%	0.10%	0.09%	0.10%	0.08%	0.10%
12-19 years	0.63%	0.57%	0.54%	0.54%	0.50%	0.54%
≥20 years	24.9%	23.7%	24.9%	25.0%	24.4%	24.5%
METS	0.37%	0.36%	0.33%	0.34%	0.34%	0.39%
<12 years	0.03%	0.03%	0.03%	0.03%	0.02%	0.03%
12-19 years	0.17%	0.17%	0.16%	0.16%	0.15%	0.17%
≥20 years	0.46%	0.45%	0.41%	0.43%	0.42%	0.49%
T2D	6.7%	6.4%	6.8%	6.9%	6.9%	6.9%
<12 years	0.06%	0.06%	0.06%	0.06%	0.05%	0.05%
12-19 years	0.26%	0.26%	0.25%	0.24%	0.22%	0.23%
≥20 years	8.9%	8.6%	9.0%	9.1%	9.1%	9.2%

Prevalence of T2D Complications

- Given the association of obesity and T2D, including the rising rates of each globally (Figure 2), prevalence of T2D related complications was examined among patients with T2D to investigate whether T2D may be increasing in complexity

Figure 2. Projected Prevalence of Diabetes



Data from: International Diabetes Foundation

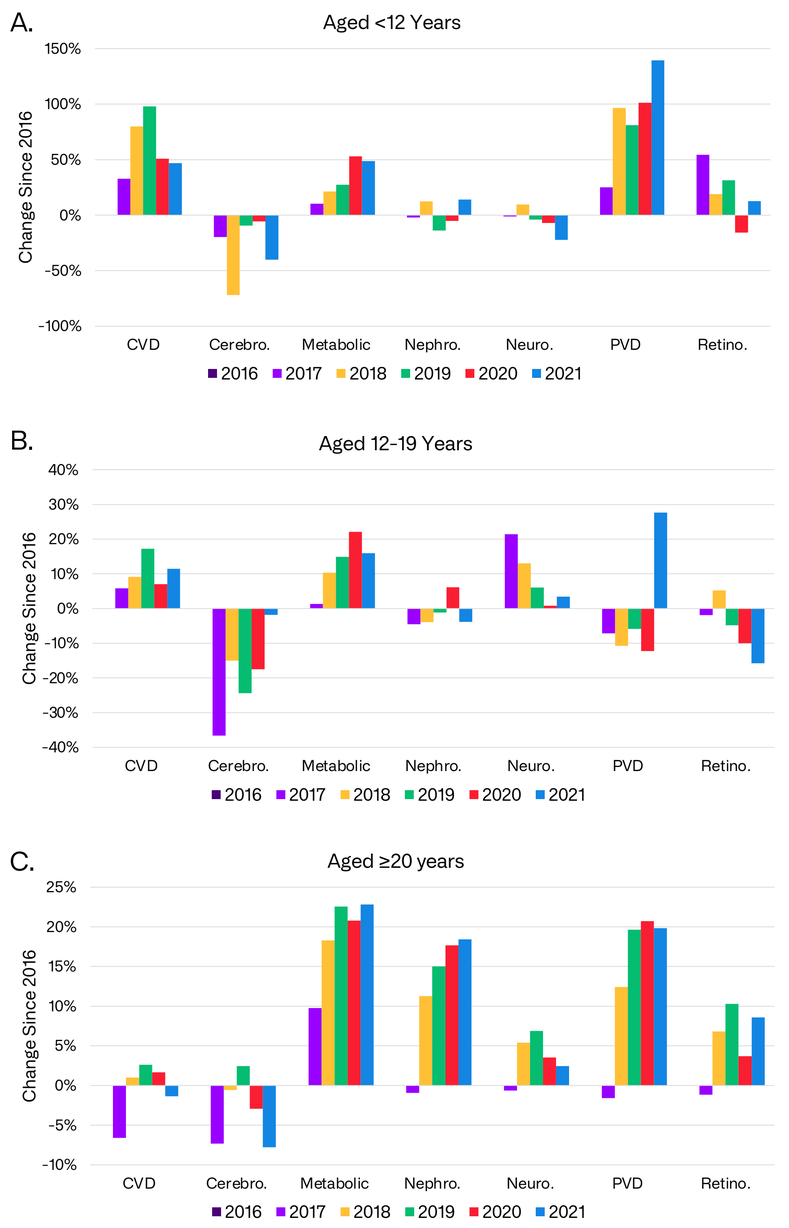
- Among all patients with T2D the most common diabetes related complications were CVD, neuropathy, and nephropathy (Table 2)
  - Metabolic complications were the most common among patients aged <12 years and aged 12-19 years

Table 2. T2D-related Complications in Patients with T2D

	2016	2017	2018	2019	2020	2021
CVD	24.0%	22.4%	24.3%	24.7%	24.4%	23.7%
<12 years	1.4%	1.8%	2.5%	2.7%	2.1%	2.0%
12-19 years	2.7%	2.9%	3.0%	3.2%	2.9%	3.0%
≥20 years	24.1%	22.6%	24.4%	24.8%	24.5%	23.8%
Cerebrovascular	4.9%	4.5%	4.9%	5.0%	4.8%	4.5%
<12 years	0.4%	0.4%	0.1%	0.4%	0.4%	0.3%
12-19 years	0.4%	0.2%	0.3%	0.3%	0.3%	0.4%
≥20 years	4.9%	4.6%	4.9%	5.0%	4.8%	4.5%
Metabolic	2.7%	2.9%	3.1%	3.2%	3.2%	3.3%
<12 years	27.5%	30.3%	33.4%	35.0%	42.1%	40.9%
12-19 years	18.6%	18.8%	20.5%	21.3%	22.7%	21.5%
≥20 years	2.6%	2.8%	3.0%	3.1%	3.1%	3.1%
Nephropathy	14.0%	13.9%	15.6%	16.1%	16.5%	16.6%
<12 years	1.9%	1.9%	2.2%	1.7%	1.8%	2.2%
12-19 years	3.5%	3.3%	3.4%	3.5%	3.7%	3.4%
≥20 years	14.1%	13.9%	15.6%	16.2%	16.5%	16.6%
Neuropathy	19.0%	18.9%	20.1%	20.4%	19.7%	19.5%
<12 years	2.2%	2.1%	2.4%	2.1%	2.0%	1.7%
12-19 years	4.4%	5.3%	4.9%	4.6%	4.4%	4.5%
≥20 years	19.1%	19.0%	20.2%	20.5%	19.8%	19.6%
PVD	9.5%	9.3%	10.7%	11.4%	11.5%	11.4%
<12 years	0.7%	0.8%	1.3%	1.2%	1.3%	1.6%
12-19 years	1.6%	1.5%	1.4%	1.5%	1.4%	2.0%
≥20 years	9.5%	9.4%	10.7%	11.4%	11.5%	11.4%
Retinopathy	11.3%	11.1%	12.0%	12.4%	11.7%	12.2%
<12 years	1.9%	2.9%	2.2%	2.5%	1.6%	2.1%
12-19 years	3.6%	3.5%	3.8%	3.4%	3.3%	3.0%
≥20 years	11.3%	11.2%	12.1%	12.5%	11.7%	12.3%

- Among all patients with T2D, the greatest changes over the study period were observed for metabolic complications and PVD, which increased 22% and 20% respectively from 2016 to 2022; nephropathy also increased 18% over that time (Table 2)
- Differential patterns in complication rates were observed over time across age groups (Figure 3A-3C)
  - Compared to 2016, there were notable and consistent increases in CVD, PVD, and metabolic disorders among patients aged <12 years (Figure 3A)
  - Consistent increases in the prevalence of CVD, metabolic disorders, and neuropathy were also observed among patients aged 12-19 years (Figure 3B)
  - Patients aged ≥20 years saw increases in the prevalence of retinopathy, nephropathy, neuropathy, PVD, and metabolic conditions over the study period (Figure 3C)

Figure 3. Change in T2D Complications Since 2016



Abbreviations: Cerebro – cerebrovascular; Nephro – nephropathy; Neuro – neuropathy; Retino - retinopathy

Limitations

- This study included patients with commercial or private Medicare insurance; results may not extend to patients with other types or the uninsured
- Prevalence rates were based on ICD-10 diagnosis codes appearing in the administrative claims record during the calendar year and thus may not reflect conditions that were not treated in the calendar year
- Although other studies have connected obesity and T2D, no formal associations between the two conditions were investigated in this study; thus all results are correlational

Conclusions

- Analyses in US data indicate increasing rates of obesity related conditions, including complications of T2D over time
  - Notably, increases were observed among younger, pediatric populations, who are not typically candidates for these longer-term chronic conditions
- Although there are notable differences between US and European healthcare systems, the US may be able to serve as a precursor for European populations, especially for conditions that are increasing world-wide, like obesity
- Further study is warranted into the longer-term impacts of rising rates of obesity, especially among younger individuals, as increased risk of developing other conditions such as hyperlipidemia, hypertension, T2D, and METS have notable implications both for patients and society at large

References

1. Ward ZJ, et al. N Engl J Med. 2019;381:2440-2450; 2. Apovian CM. AJMC. 2016;22:S176-S185. 3. Jia H et al. Journal of Public Health. 2005;27(2):156-164

Disclosure

This study was funded by Merative; all authors are employees of Merative.

Presented at ISPOR Europe 2023, November 12-15, 2023, Copenhagen, Denmark