The economic burden of patients diagnosed with non-alcoholic steatohepatitis in France, Germany, Italy, Spain and the United Kingdom in 2018

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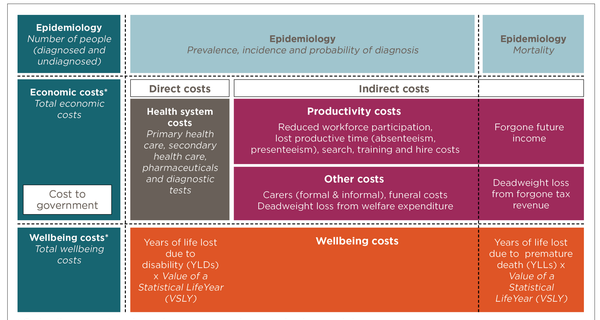
Background and aims

- Although non-alcoholic steatohepatitis (NASH) is a major cause of chronic liver disease worldwide,[1-4] there are few data on its epidemiology, diagnosis, treatment patterns and prognosis, and the costs associated with the condition[4, 5]
- **Importantly, a large proportion of the prevalent population have early-stage (F0–F2) disease:** these patients have **few symptoms** and hence are **unlikely to be diagnosed**, or to receive treatment[4, 5]
- The higher risk of progression to decompensated cirrhosis (DCC), hepatocellular carcinoma (HCC), liver transplant or death in people with advanced liver fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis), means that the disease burden and incurred costs increase with disease severity.[1-3] F4 excludes decompensated cirrhosis throughout this poster
- There is a need for comprehensive epidemiological and economic data on the impact of advanced fibrosis due to NASH, which could help foster changes in public health measures to tackle this healthcare challenge
- This study was conducted to estimate the disease burden and economic costs in adult patients diagnosed with NASH in the European Union 5 (EU5) countries (France, Germany, Italy, Spain and the United Kingdom) during 2018

Methods

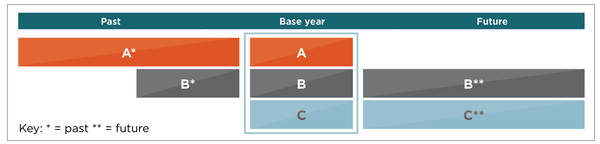
- The burden of NASH was assessed using a prevalence approach[6] to estimate the number of adults with NASH and the economic and wellbeing costs attributable to diagnosed NASH in a base period (2018, Figure 2)
- The model estimates the costs of NASH in a given year (2018), not lifetime costs. To make this distinction, three different patient cohorts are considered (Figure 2)
- Epidemiological estimates were derived from two modelling studies – high-estimate (High)[7,8] and low-estimate (Low)[1] scenarios
- Resource use was estimated based on extensive literature review and expert opinion from clinical experts, health economists and patient groups (where data were lacking) to reflect current clinical practice
- Costs of treating comorbidities (obesity, type 2 diabetes, cardiovascular mortality) were not captured; however, the epidemiology of comorbidities was an input to the epidemiological estimates sourced from the literature
- Wellbeing costs were estimated using World Health Organisation burden of disease methodology, with costs sourced from literature and national or local fee schedules
- Calculations accounted for age ranges and male/female sex
- The estimated economic costs and wellbeing costs are not additive; total economic cost does not include wellbeing costs
- Sensitivity testing was built into the model, with regard to both costs and the two epidemiological estimates, to evaluate the impact of changes in model inputs

Figure 1. Model overview



*Only diagnosed patients incur economic costs in the model

Figure 2. Cost-of-illness model estimates the costs of NASH in 2018 – definition of the base period

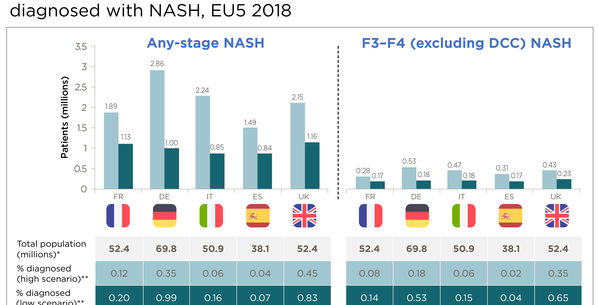


A. Patients who experienced NASH in the past and up to the base year, incurring costs in the past and base year.
B. Patients who experienced NASH in the past, as well as in the current year and will do so in the future, incurring costs in the past, base year and future.
C. Patients who first experience NASH in the current year and will do so in the future, incurring costs in the base year and future.

Results: Epidemiology

- It was estimated that in the EU5 in 2018, 4.0–8.5 million adults were living with F0–F2 NASH, and 0.9-2.0 million were living with advanced fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis) (Figure 3)
- Of these, only 4.8–5.5% of patients with F0–F2 NASH, and 37.8-39.1% of those with advanced fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis), were diagnosed and under medical care
  - Thus, the proportion of patients with advanced fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis) who had received a diagnosis comprised 0.13-0.30% of the total EU5 adult population in 2018

Figure 3. Estimate prevalence of adult patients living and diagnosed with NASH, EU5 2018



	FR	DE	IT	ES	UK	FR	DE	IT	ES	UK
Total population (millions)*	52.4	69.8	50.9	38.1	52.4	52.4	69.8	50.9	38.1	52.4
% diagnosed (high scenario)**	0.12	0.35	0.06	0.04	0.45	0.08	0.18	0.06	0.02	0.35
% diagnosed (low scenario)**	0.20	0.99	0.16	0.07	0.83	0.14	0.53	0.15	0.04	0.65

F3–F4 (excluding decompensated cirrhosis): advanced fibrosis due to NASH; DCC: Decompensated cirrhosis *Total population of adults aged 18 or over in country. **Calculated as a percentage of the total population. High scenario: Estes 2018; Low scenario: Younossi 2016

Results: Economic, health system and wellbeing costs

Economic costs

- Economic costs, including health system costs, are applied only to the proportion of the NASH population that are likely to be diagnosed[9]
- Across the EU5, total economic costs for all-stage NASH ranged from €6,065 to €13,424 million, and direct health system costs from €619 to €1,292 million, (Figure 4a, 4b)

Health system costs

- Table 1 shows costs by type for each EU5 country, and the notable variation in these costs across the EU5 countries
- Total health system costs were greater in patients with advanced fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis), compared with those with F0–F2 NASH (Figure 5)
- Average per person health system costs were €1,470 to €1,244 with any-stage NASH, and €2,875 per person with advanced fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis) (Figure 6)

Wellbeing costs

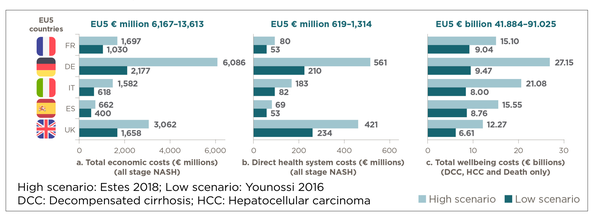
- Total wellbeing costs (borne directly by the individuals) ranged from €41,536 to €90,379 million, primarily driven by the high mortality rate of patients with NASH (Figure 4c)

Table 1. Health system costs (F0-F4 excluding DCC), EU5 2018, (€ millions)

EU5 countries	Secondary care	Diagnostic testing	Primary care	Pharmaceuticals	Medical Research
FR	11.98–19.97	5.51–9.18	0.03–0.05	0.28–0.47	N/A
DE	157.00–450.00	26.00–73.00	4.00–13.00	1.00–4.00	N/A
IT	1.31–3.46	5.10–13.44	0.37–0.96	3.10–8.17	N/A
ES	0.47–0.83	0.95–1.67	0.27–0.48	0.04–0.07	N/A
UK*	139.84–248.94	53.60–99.44	12.99–24.09	12.73–23.62	2.37–2.37

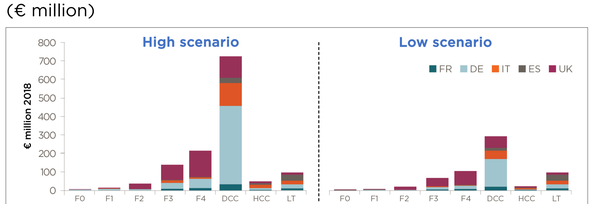
Range represents low scenario to high scenario costs. N/A, not applicable.
* Exchange rate of £1 = €1.10936. DCC: Decompensated cirrhosis

Figure 4. Total economic, direct health system and wellbeing costs of NASH, EU5 2018



High scenario: Estes 2018; Low scenario: Younossi 2016
DCC: Decompensated cirrhosis; HCC: Hepatocellular carcinoma

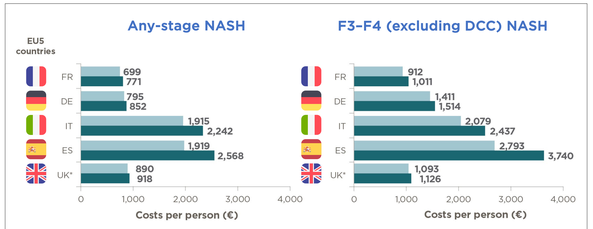
Figure 5. Total health system costs by disease stage, EU5, 2018 (€ million)



Country	FR	DE	IT	ES	UK
Total number of people with diagnosis (High scenario)	106,440	691,963	83,760	28,302	435,217
Total number of people with diagnosis (Low scenario)	64,010	241,447	32,010	16,184	234,685

Exchange rate of £1 = €1.10936 for UK costs. High scenario: Estes 2018; Low scenario: Younossi 2016
F4 excludes decompensated cirrhosis; DCC: Decompensated cirrhosis; HCC: Hepatocellular carcinoma; LT: Liver transplant

Figure 6. Per person health system costs of NASH, EU5 2018



High scenario: Estes 2018; Low scenario: Younossi 2016
F3–F4 (excluding decompensated cirrhosis); DCC: Decompensated cirrhosis. Note that low scenario costs per person are higher as some cost elements are the same for low and high scenarios, but are spread across fewer people overall for low scenario calculations. * Exchange rate of £1 = €1.10936.

Conclusions

- This study identified a low level of diagnosis of advanced liver fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis) in the EU5 countries (2018)
  - The lowest prevalence and diagnosis rates were seen in France, Italy and Spain
- Advanced fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis) imposes significant economic and wellbeing costs on the EU5 population
  - The high wellbeing costs, relative to economic costs, reflect the high mortality rate for NASH patients and the relatively low disability associated with NASH disease stages
  - Healthcare costs were notably higher in the UK and Germany, although wellbeing costs were lowest in the UK, as were the per person heath system costs of advanced fibrosis due to NASH
  - People with advanced fibrosis due to NASH (F3–F4 excluding decompensated cirrhosis) incur significant financial costs, in addition to severe reductions in their quality of life, with the greatest financial burden borne by the patients themselves
- Prevention and appropriate management of NASH (particularly in patients with advanced fibrosis F3–F4 excluding decompensated cirrhosis) could result in significant reductions in economic costs and improvements in wellbeing

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