

Disease Burden of Non Alcoholic Fatty Liver Disease (NAFLD)

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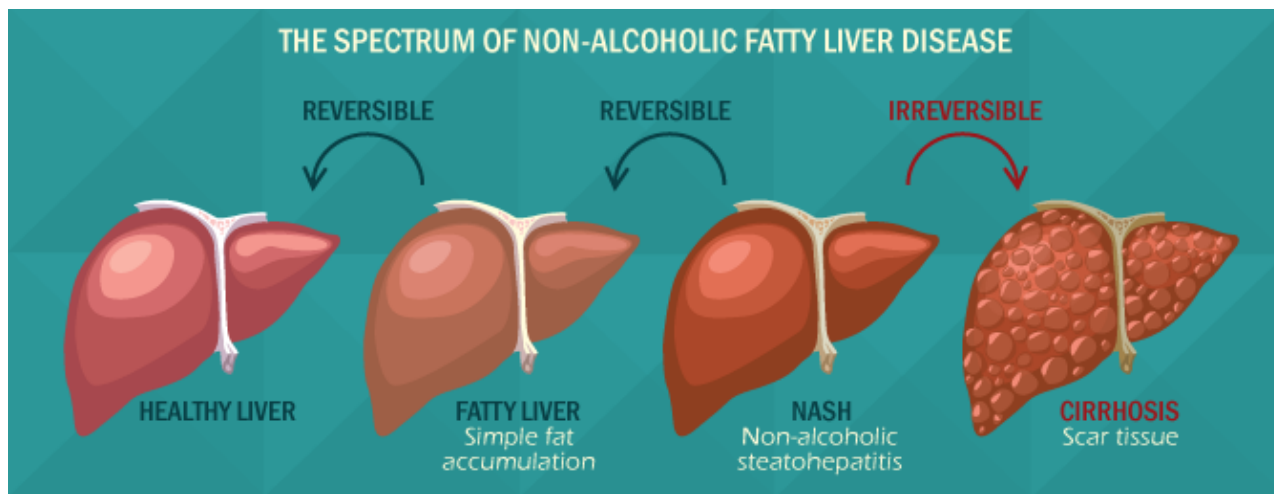
H. Razavi has not received any personal remuneration for this or any other project.

This work would not be possible without the inputs of the following experts

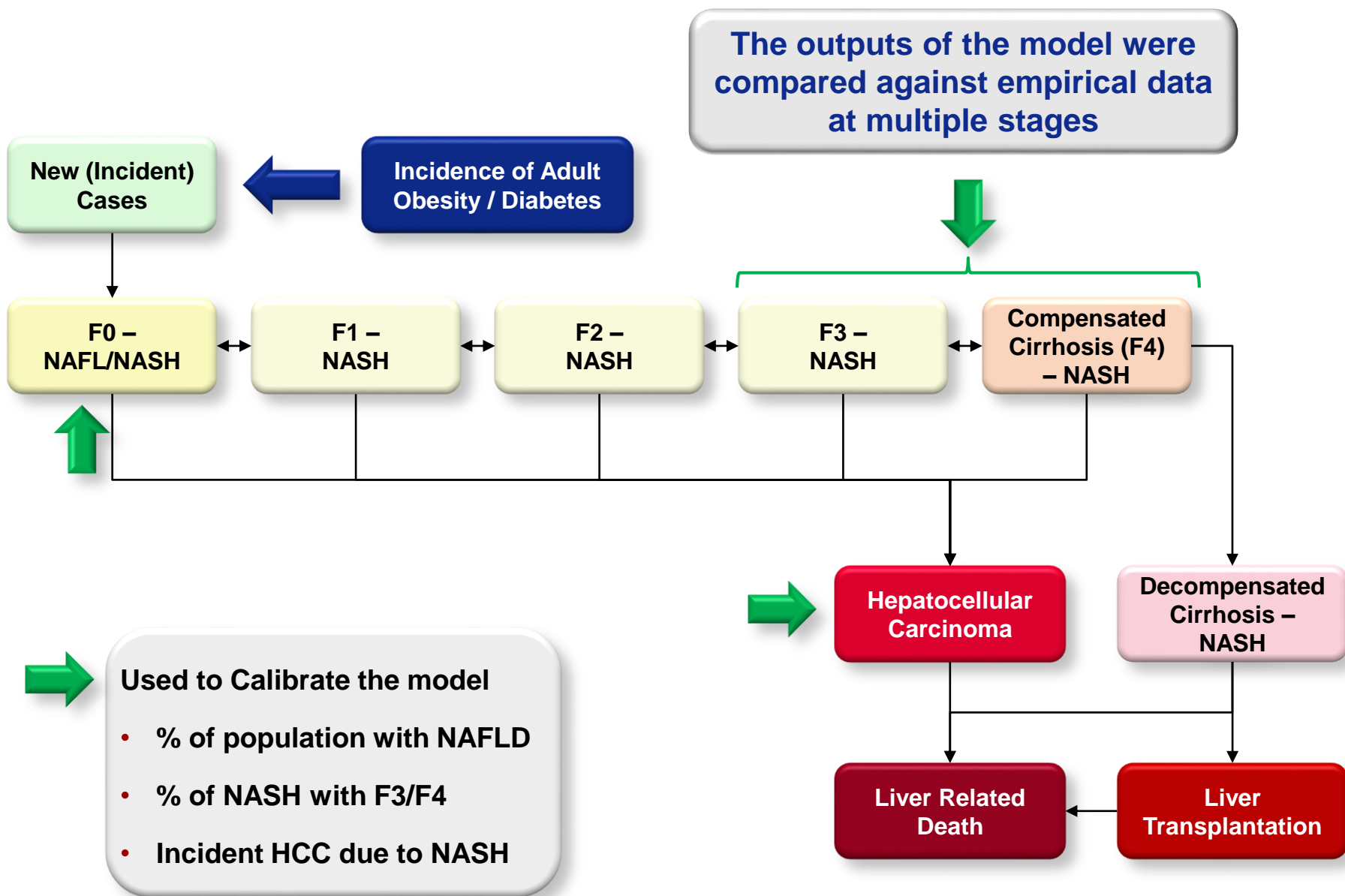
- France – Drs. Vlad Ratziu & Lawrence Serfaty
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- Italy – Drs. Stefano Bellentani, Antonio Craxi, Giulio Marchesini & Salvatore Petta
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Methodology

- Convened a panel of NAFLD experts in each country
- Collect published epidemiology data for NAFLD
- Gathered country specific rates for obesity and diabetes to estimate incidence
- Used published work to estimate progression rates for non-alcoholic fatty liver (NAFL) and nonalcoholic steatohepatitis (NASH)
- Modeled the disease progression
- Validates the forecasts against reported NASH related HCC cases



The disease progression model tracked the population over time, taking into consideration the reversible nature of the disease



NASH prevalence and obesity in the EU5 are lower than the US

	BMI≥30	% of total population ≥15+ with NAFLD	% of NAFLD with NASH	% of total population ≥15+ with NASH
US	28%	30%	20%	6.3%
France	16%	25%	16%	4.2%
Germany	19%	25%	18%	4.6%
Italy	16%	28%	17%	4.9%
Spain	18%	25%	17%	4.4%
UK	21%	25%	18%	4.8%
China	4%	20%	13%	2.8%
Japan	4%	20%	16%	3.4%

Obesity has been increasing in the European countries NAFLD is accounting for more HCC cases in the UK

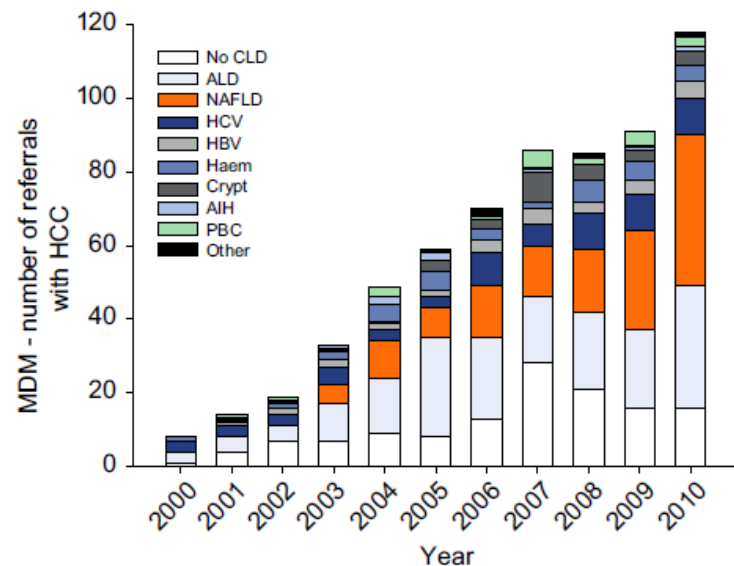
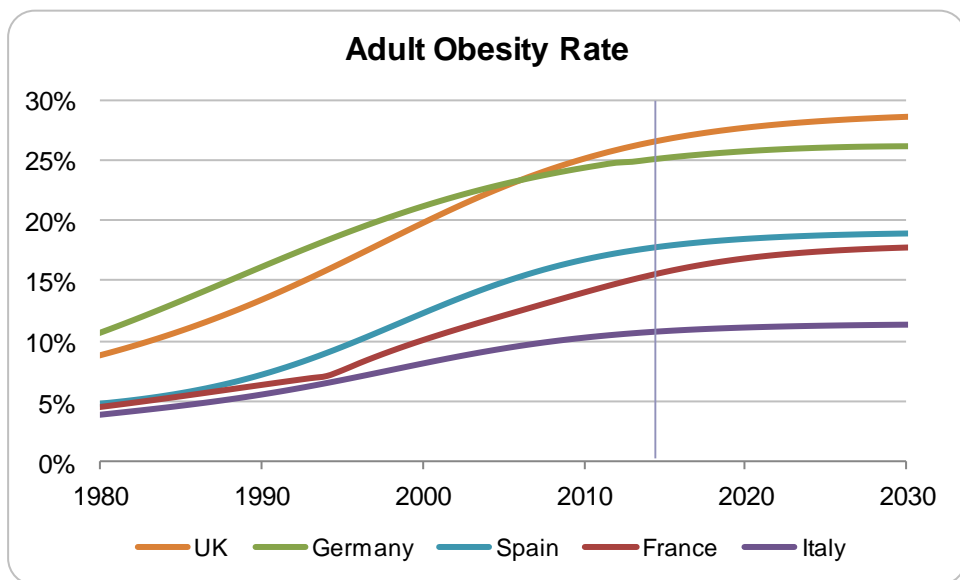
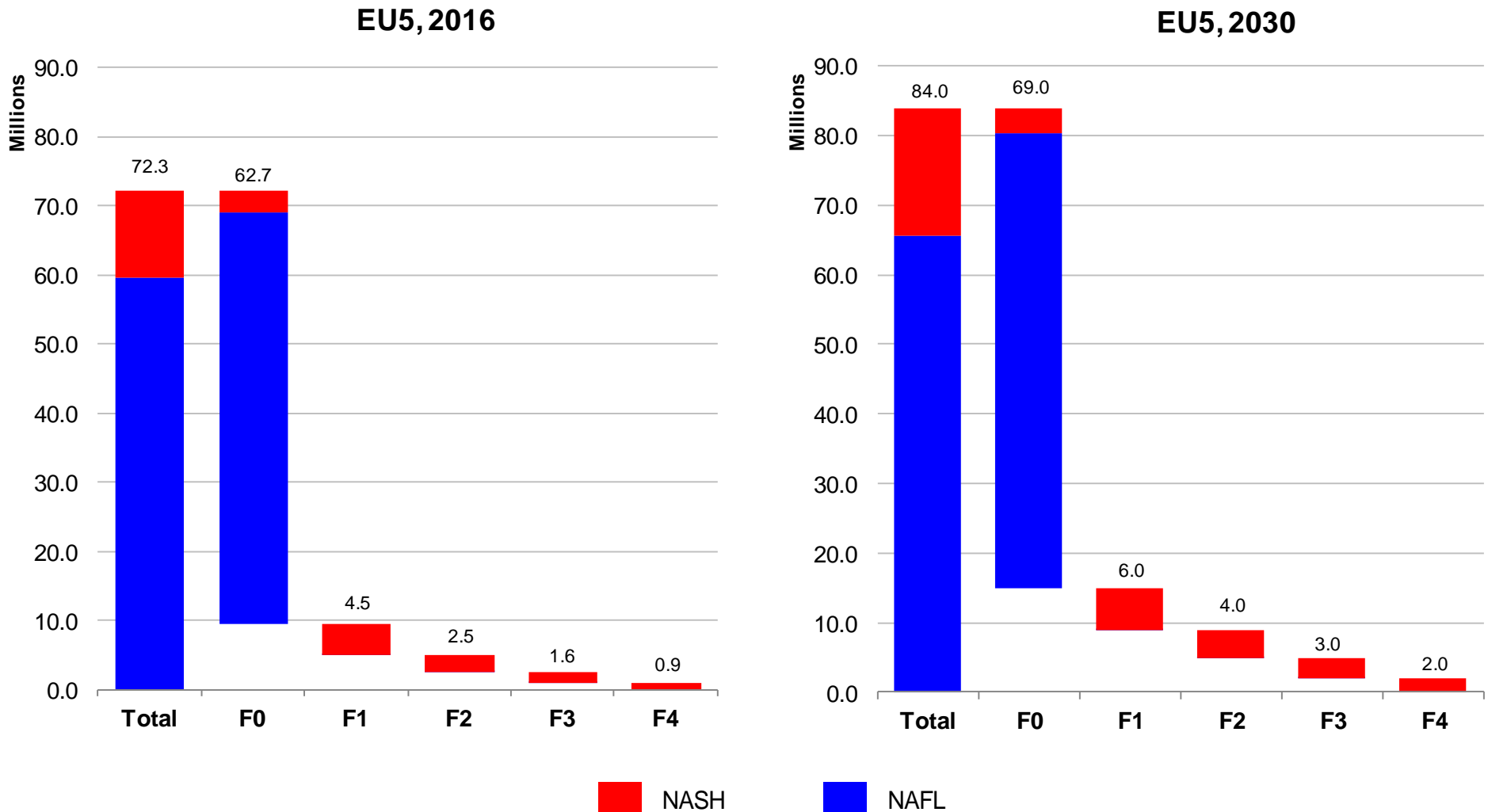


Fig. 2. Etiologies of chronic liver disease associated with HCC. ALD, NAFLD and cases without CLD account for the majority of cases. NAFLD associated HCC increased from an unknown entity at the start of the decade to the commonest CLD associated with HCC.

Adult obesity have been increasing but the rate of increase has (and is projected to) slowed.

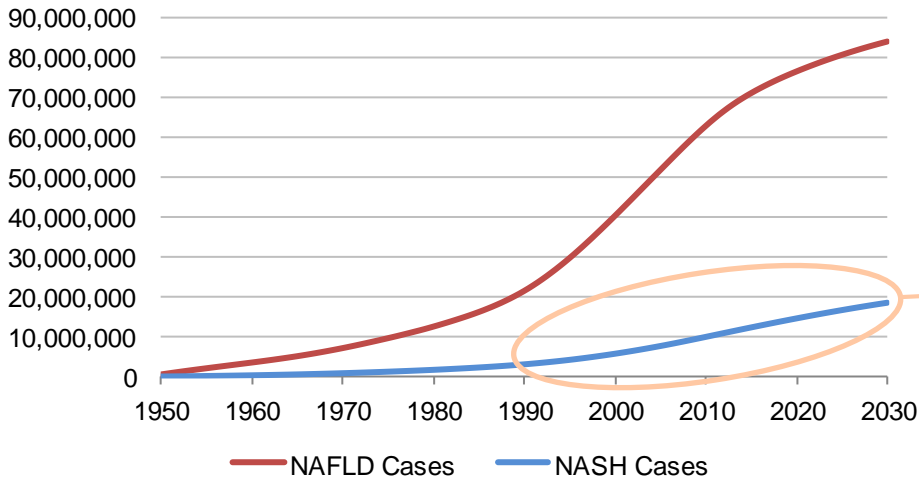
UK – The proportion of HCC attributable to NAFLD in Newcastle was 34.8% in 2010, a tenfold increase as compared to 2000 (Dyson 2014)

Most individuals will remain as NAFL but the NASH population is expected to grow by 45% while cirrhotic cases will increase by 120%

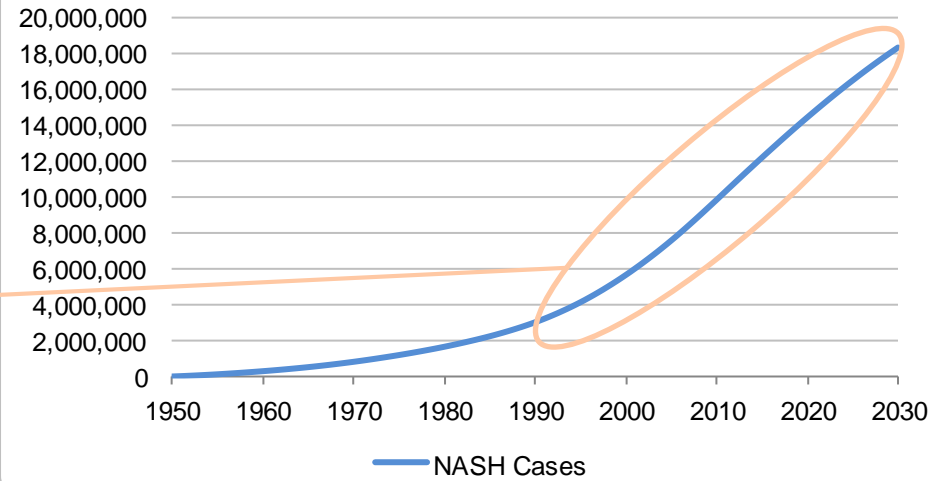


Although the increase in total NAFLD cases is slowing down, NASH, HCC, and liver related deaths is projected to continue to increase

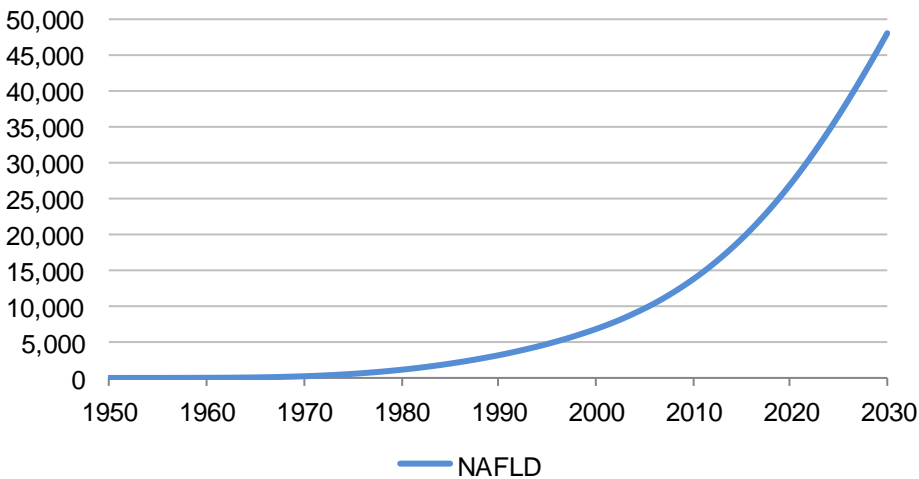
NAFLD & NASH Cases - EU5



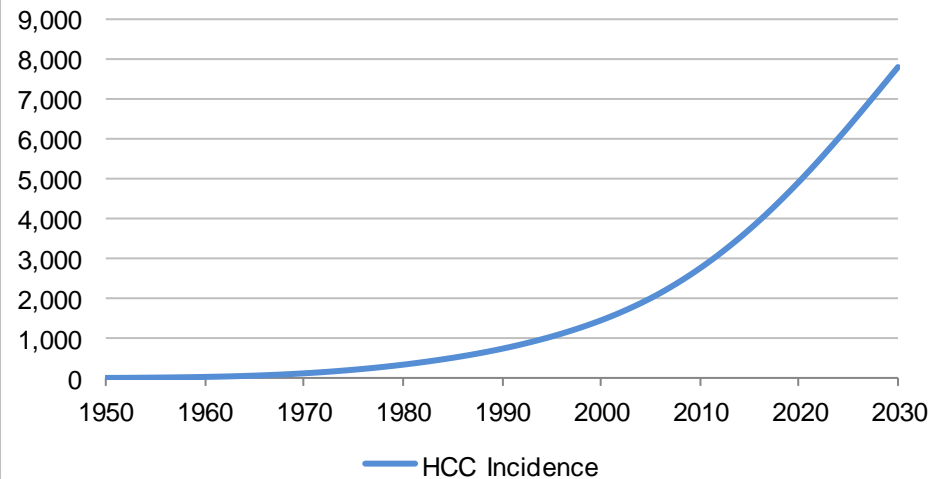
NASH Cases - EU5



Annual Liver Related Deaths - EU5



Annual HCC Incidence - EU5

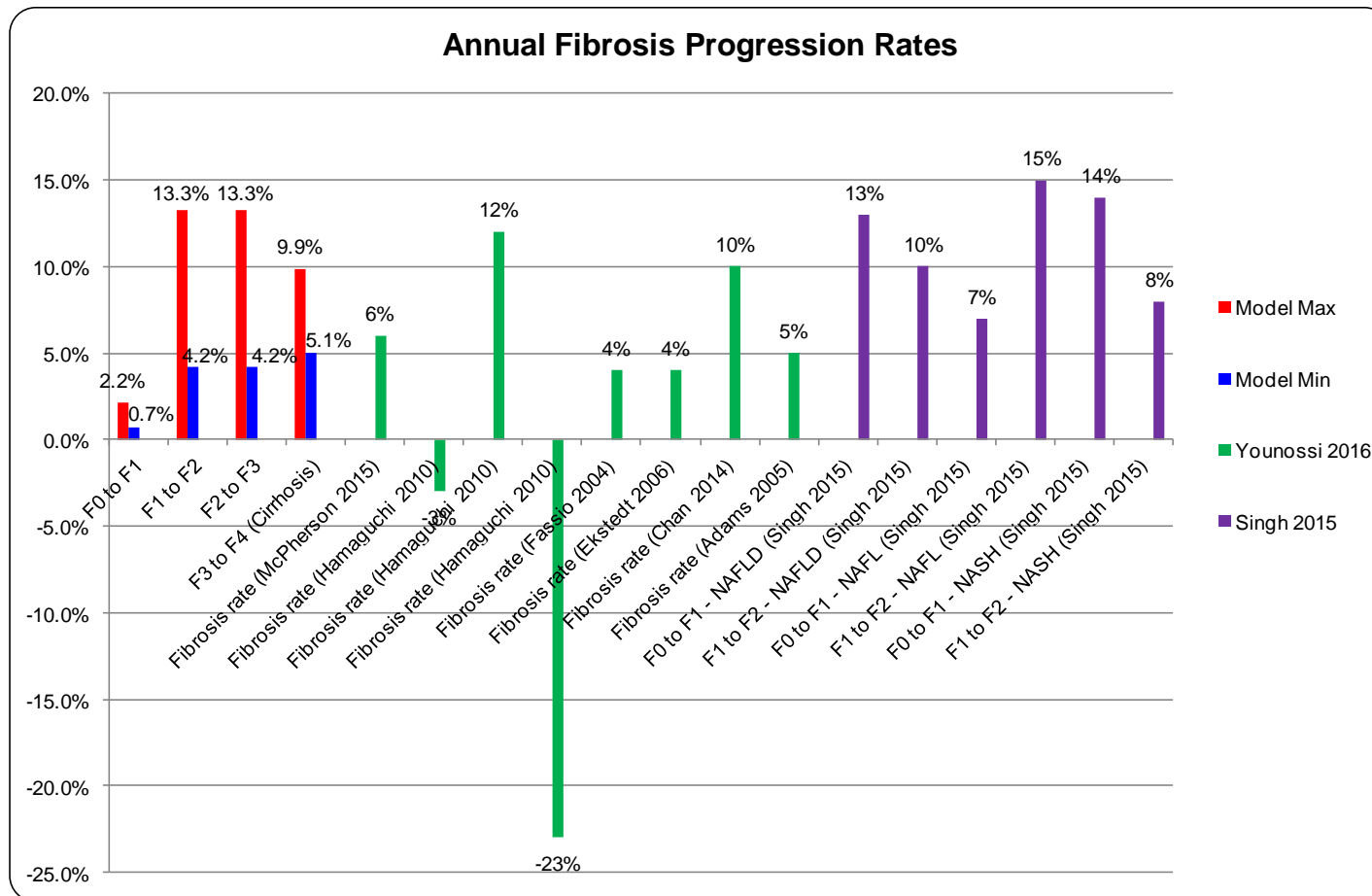


Conclusions

- In the absence of interventions, advanced liver diseases associated with NAFLD will more than double over the next 15 years while total NAFLD cases will increase by 16%
- NAFLD is reversible – diet and exercise can reverse liver fibrosis
- Interventions are required to manage the increase in future disease burden
- The European Union should promote awareness of NAFLD and strategies to reduce the disease burden (including weight loss and diet)
- These same interventions will also have an impact on other non-communicable diseases including cardiovascular diseases and diabetes
- Better reporting systems are required to track NAFLD related disease burden to measure progress

US Model Transition Rates

- Model fibrosis progression as compared to Younossi 2016 and Singh 2015

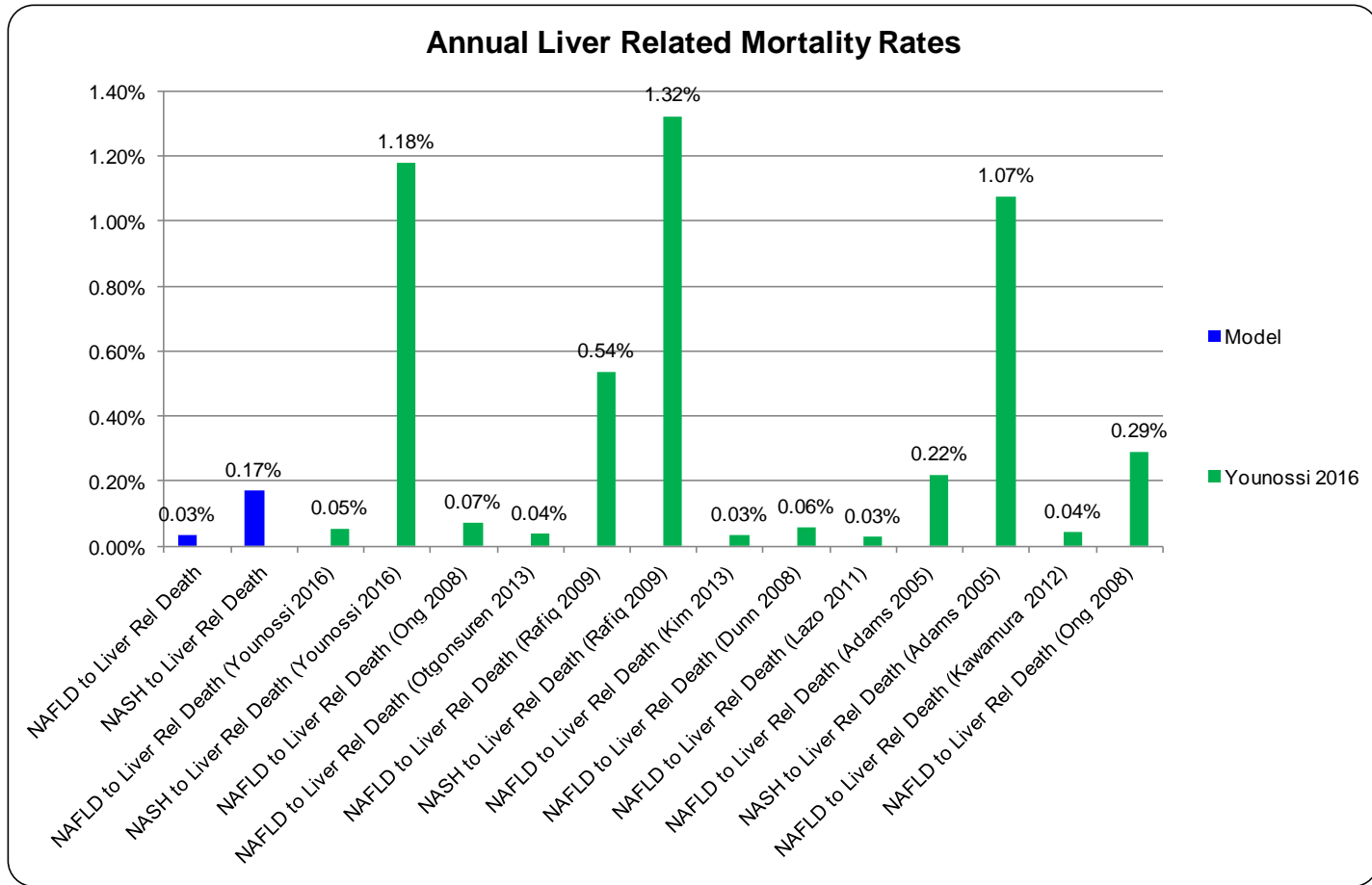


- Singh, S., et al., Fibrosis progression in nonalcoholic fatty liver vs nonalcoholic steatohepatitis: a systematic review and meta-analysis of paired-biopsy studies. Clin Gastroenterol Hepatol, 2015. 13(4): p. 643-54.e1-9.

- Younossi ZM, Koenig AB, Abdelatif D, Fazel Y, Henry L, Wymer M. Global Epidemiology of Non-Alcoholic Fatty Liver Disease-Meta-Analytic Assessment of Prevalence, Incidence and Outcomes. Hepatology. 2016. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/26707365>

US Model Transition Rates

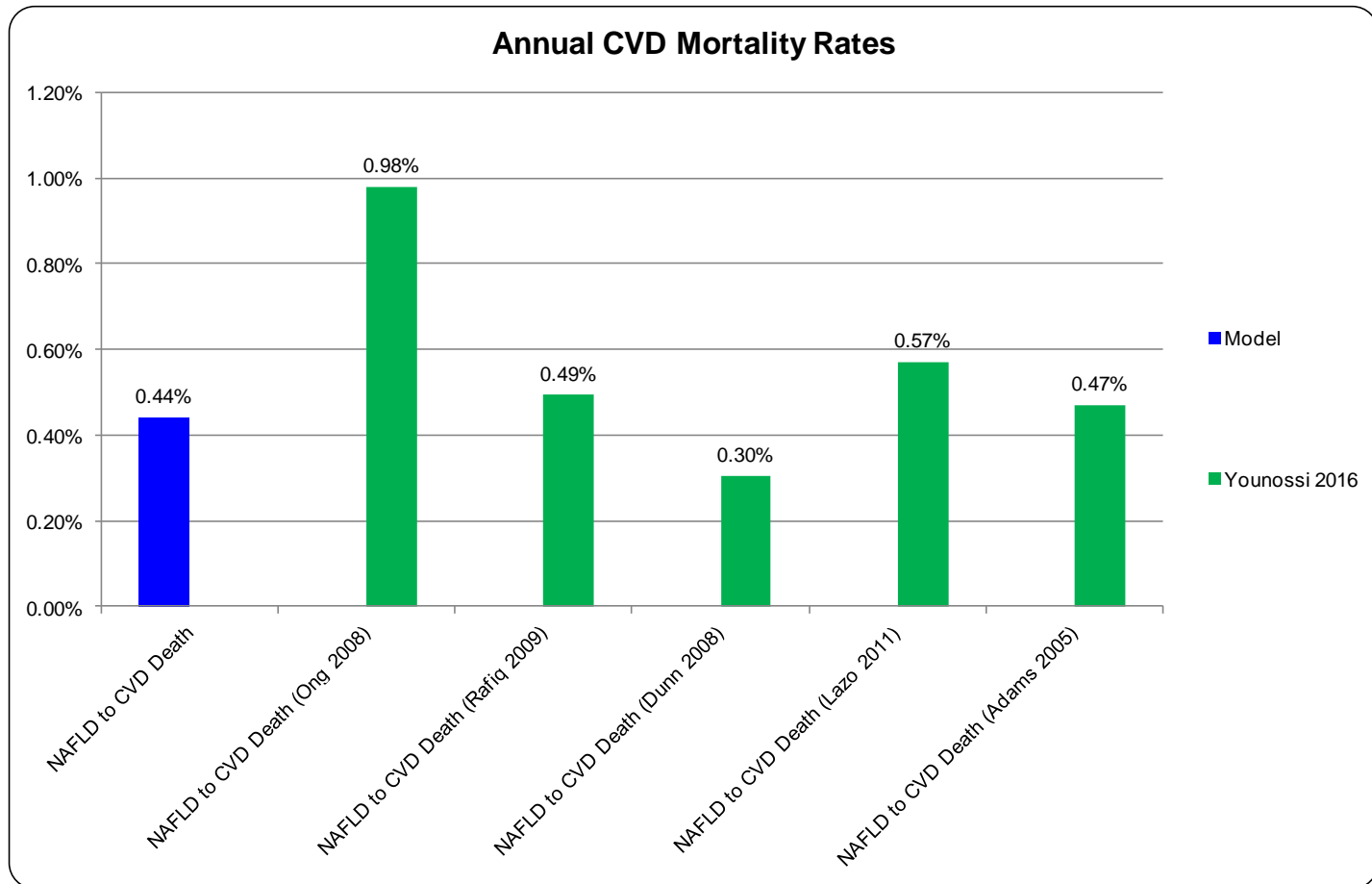
- Model liver related mortality as compared to Younossi 2016



- Younossi ZM, Koenig AB, Abdelatif D, Fazel Y, Henry L, Wymer M. Global Epidemiology of Non-Alcoholic Fatty Liver Disease-Meta-Analytic Assessment of Prevalence, Incidence and Outcomes. Hepatology. 2016. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/26707365>

US Model Transition Rates

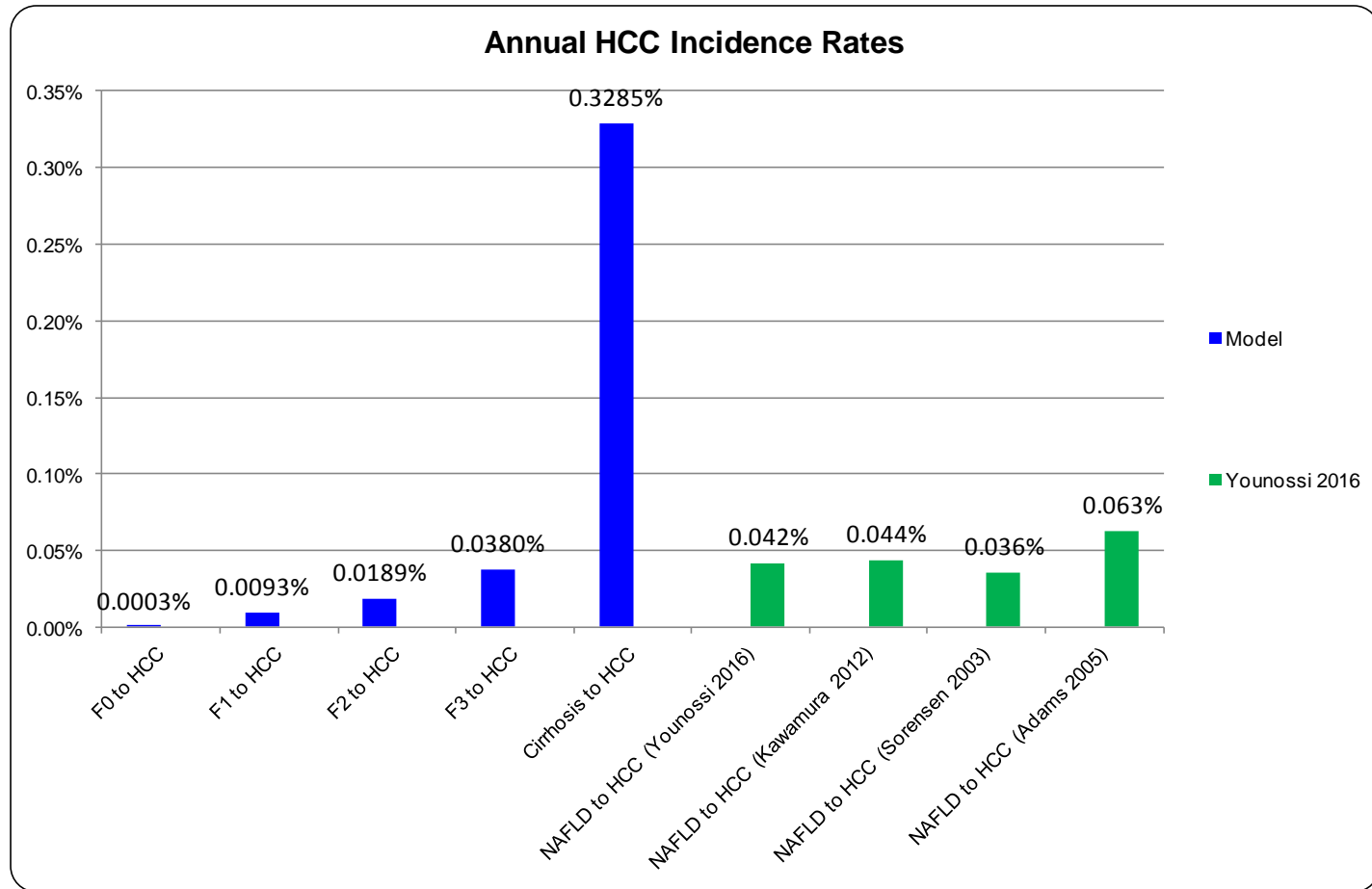
- Model CVD mortality as compared to Younossi 2016



- Younossi ZM, Koenig AB, Abdelatif D, Fazel Y, Henry L, Wymer M. Global Epidemiology of Non-Alcoholic Fatty Liver Disease-Meta-Analytic Assessment of Prevalence, Incidence and Outcomes. Hepatology. 2016. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/26707365>

US Model Transition Rates

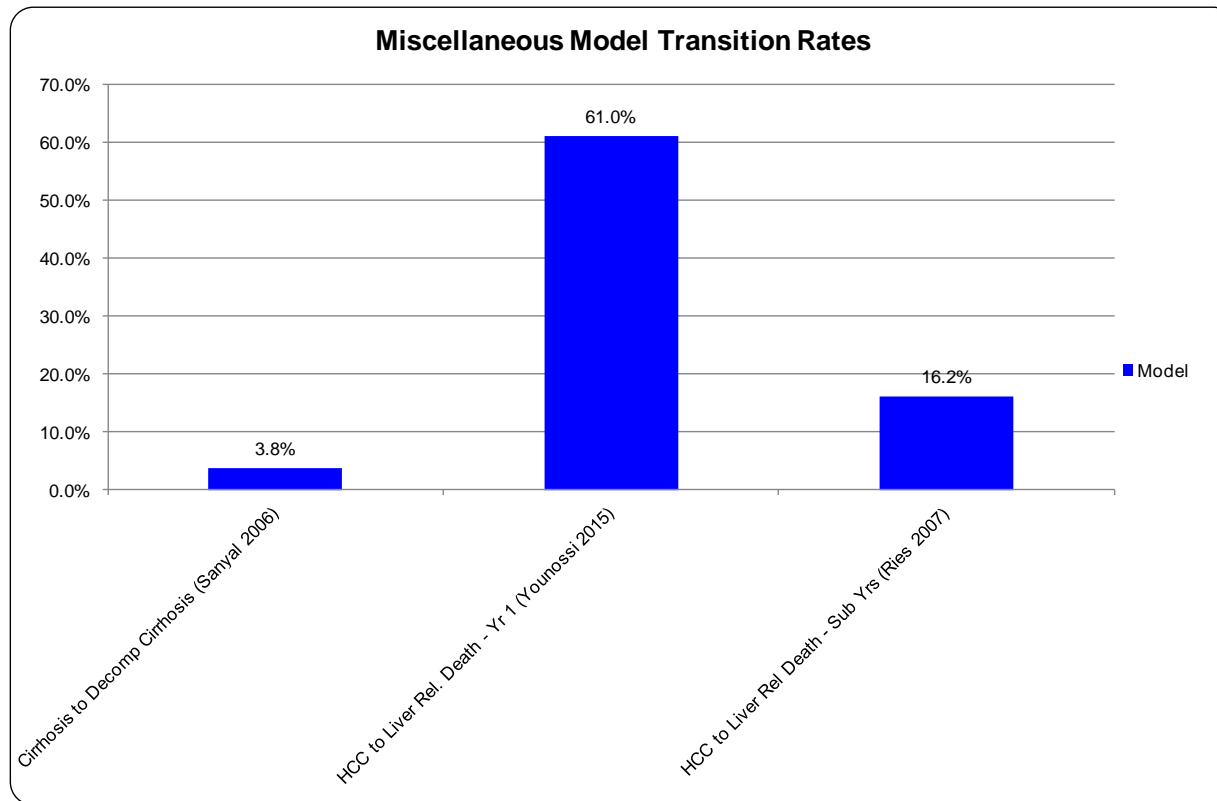
- Model HCC incidence as compared to Younossi 2016



- Younossi ZM, Koenig AB, Abdelatif D, Fazel Y, Henry L, Wymer M. Global Epidemiology of Non-Alcoholic Fatty Liver Disease-Meta-Analytic Assessment of Prevalence, Incidence and Outcomes. Hepatology. 2016. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/26707365>

US Model Transition Rates

- Other transition rates used in model:



- Sanyal AJ, Banas C, Sargeant C, Luketic VA, Sterling RK, Stravitz RT, et al. Similarities and differences in outcomes of cirrhosis due to nonalcoholic steatohepatitis and hepatitis C. *Hepatology*. 2006;43(4):682-9. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/16502396>

- Younossi ZM, Otgonsuren M, Henry L, Venkatesan C, Mishra A, Erario M, et al. Association of nonalcoholic fatty liver disease (NAFLD) with hepatocellular carcinoma (HCC) in the United States from 2004 to 2009. *Hepatology*. 2015;62(6):1723-30. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/26274335>

- Ries LAG, Young GL, Keel GE, Eisner MP, Lin YD, Horner M-J. SEER survival monograph: cancer survival among adults: U.S. SEER program, 1988-2001, patient and tumor characteristics. [NIH Pub.No.07-6215]. 2007. Bethesda, MD, National Cancer Institute, SEER Program.