Cohort Effect in HCV Infection, Morbidity and Mortality
Results from 7 African Countries

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Agenda

- Background of CDA
- What is Hepatitis C?
- Global Hepatitis C Disease Burden
- Research Methodology
- Results
- Conclusion
- Questions
The Center for Disease Analysis (CDA)

- Public health research firm with expertise in epidemiology and disease modeling
  - **Mission statement** – study complex and poorly understood diseases and publish results to help inform the community at large and support decision making
- Main area of focus is liver diseases – Hepatitis C (HCV), Hepatitis B, NASH & NAFLD
- We use a multi-disciplinary approach, combining epidemiology, modeling, and decision science while collaborating with local experts
- We have developed a number of tools to help countries develop strategies to manage hepatitis disease burden
- We publish all findings with our collaborators as co-authors
What is Hepatitis C?

• One of many known viruses that can infect, inflame and eventually damage the liver

• Carries a significant disease burden as chronic infection can progress to decompensated cirrhosis (DC), hepatocellular carcinoma (HCC), and liver related death (LRD) over time \(^{(1)}\)
Global Hepatitis C Disease Burden

- **Hepatitis C around the World**
  - In 2015, viremic HCV prevalence was 0.96% (0.84-1.07%) corresponding to 71 (62 – 79) million viremic HCV infections globally \(^{(2)}\)
    - Almost double the number of global HIV infections \(^{(3)}\)

- **Hepatitis C in Africa**
  - ~15 million viremic HCV infections (22% of all viremic infections) \(^{(2)}\)
  - Mostly undiagnosed and untreated \(^{(4-7)}\)
  - Dearth of information necessary to fully quantify disease burden and develop national management strategies \(^{(3,5)}\)

- **Why Hepatitis C? Why now?**
  - Newly developed pan genotypic direct acting antiviral treatments now make cure and eventually elimination possible
  - Current statistical modeling technologies make the necessary disease burden analyses possible
Research Methodology

• **Objective** – Model and analyze age-related trends in HCV infection, morbidity and mortality in *Cameroon, Egypt, Ethiopia, Ghana, Morocco, Nigeria and South Africa*.

> 7 countries analyzed embody 47% of the African continent's population.
Research Methodology

Disease burden models which simulate disease progression over time were developed for the countries analyzed

• **Model Characteristics:**
  » **Easy to use platform** – Excel-based model
  » **Transparent** – All formulas are unprotected and visible
  » **Ties to historical data** – Published data is used to calibrate the model up to 2015
  » **Measures the impact of future decisions** – Interface to input potential strategies
  » **Dynamic** – Accounts for multiple interconnected disease stages

• **Model Inputs:**
  » Annual population (1950 – 2050)
  » Mortality rates (1950 – 2050)
  » Prevalence
  » Viremic rate
  » Genotypes
  » Age and gender distribution
  » Diagnosed
  » Treated
  » HCV linked HCC
  » HCV linked liver transplants
  » Risk factors
  » SVR rates
Results – Viremic Infections

- 11 million viremic infections
- Egypt and Nigeria have the largest HCV infected populations
- Rates of infection increased with age
- Highest prevalence in individuals aged 50+
  - 11% of all infections in individuals aged 55 – 59, representing ~1.5M infected

![Total Viremic Cases by Age (2015)](image)
Results – DC, HCC and LRD

- Over 90% of DC, HCC and LRD were in individuals aged 50 years and older
- Individuals aged 65 – 69 account for ~20% of all cases of DC, HCC and LRD
- Country level age variations existed in Ghana, Ethiopia and Morocco (see appendices)
Conclusions

- High burden of viremic infection in individuals aged 55-59 with increased rate of late stage disease and death in individuals aged 65 - 69
- Screening and treatment of individuals before the age of 60 is critical to prevent progression to late stage liver disease and death
- Carefully designed strategies are necessary to maximize resources
Thank you!

CDA Website
Polaris Observatory Website
Polaris Observatory Twitter
References


Appendices — Viremic Infections

Viremic Infections as a Proportion of Total Population (2015)

Age Distribution of Viremic Infections (2015)
Appendices – Decompensated Cirrhosis

Decompensated Cirrhosis by Country (2015)
Appendices – Hepatocellular Carcinoma

Hepatocellular Carcinoma by Country (2015)
Appendices – Liver-related Death

Liver-related Deaths by Country (2015)