Economic Burden of Sexually Transmitted Infections

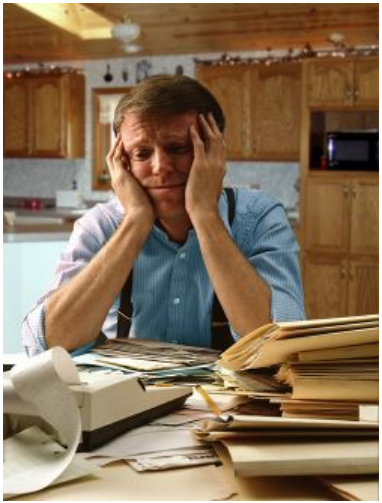
Harrell Chesson, PhD

Health Economist

Committee on Prevention and Control of Sexually Transmitted Infections in the United States, Meeting 3

October 7, 2019

Cost Of Living Now Outweighs Benefits



Source: The Onion

WASHINGTON, DC—A report released Monday by the Federal Consumer Quality-Of-Life Control Board indicates that the cost of living now outstrips life's benefits for many Americans.

"This is sobering news," said study director Jack Farness.

"Since 1965, the cost-benefit ratio of American life has been approaching parity," Farness said. "While figures prior to that date show that life was worth living, there is some suspicion that the benefits cited were superficial and misreported."

Experts nationwide have corroborated the report's findings.

Committee on Prevention and Control of Sexually Transmitted Infections in the United States: Statement of Task

- **The CDC, through NACCHO, requests that the National Academies of Sciences, Engineering, and Medicine convene an ad hoc committee to examine:**
  - The epidemiological dimensions of sexually transmitted infections (STIs) in the United States and factors that contribute to the epidemic (changes in population demographics, sexual and other behaviors, social determinants), as well as changes in the understanding of the agents that cause STIs
  - To the extent possible, the economic burden associated with STIs
  - Current public health strategies and programs to prevent and control STIs (including STI diagnostics, STI vaccines, STI monitoring and surveillance, treatment)
  - Barriers in the healthcare system and insurance coverage associated with the prevention and treatment of STIs
- **The committee will provide direction for future public health programs, policy, and research in STI prevention and control and make recommendations* as appropriate**
  - *The committee will not provide recommendations on HIV/AIDS or viral hepatitis prevention, diagnosis, treatment, policy, or research as that is not the focus of this study

What economics can contribute to NASEM report

- **Estimates of economic burden of STIs**
- **Analyses of impact and cost-effectiveness of STI prevention interventions**
  - Usually with STI model
- **Evidence of association between STI prevention funding and reduced STI incidence**
- **Analyses of policies that can affect sexual behavior and STI incidence**
- **Tools that quantify the value of STI prevention activities**

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Prevalence and incidence costs of STIs

- **Prevalence cost are the costs of treating prevalent STIs and STI-related sequelae in a given year regardless of when the STIs were acquired**
- **Incidence costs are the discounted, lifetime direct medical costs of STIs acquired in a given year**
- **Example: A woman acquires chlamydia in 2015 which causes pelvic inflammatory disease (PID) in 2017**
  - PID cost in 2017 contributes to incidence cost in 2015 and to prevalence cost in 2017

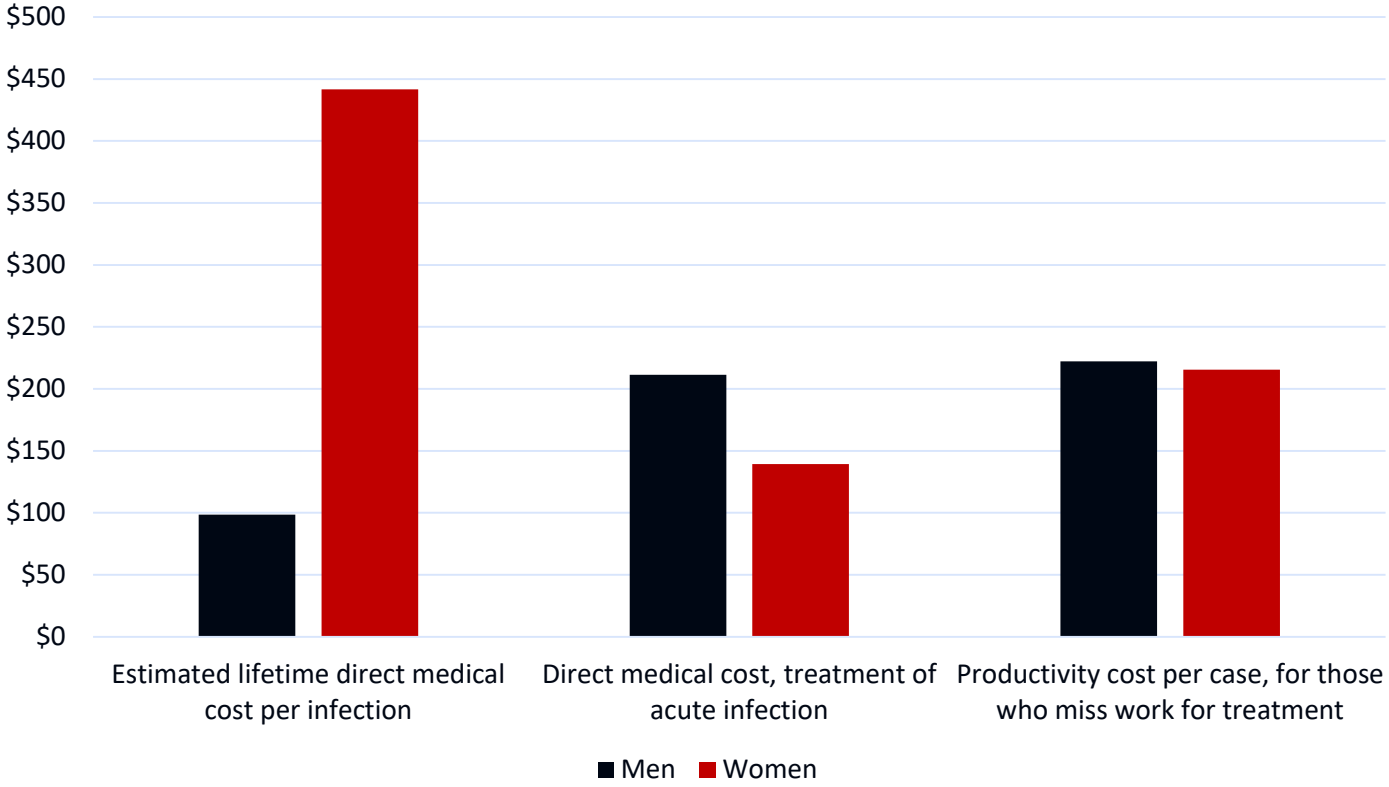
Annual direct medical cost burden from 4 studies

Adjusted to 2018 US dollars

Study	Publication year	Annual direct medical cost burden (in $ billions)		
		STIs	HIV	Total
Siegel	1997	13.2	8.8	22.0
ASHA	1998	6.3	7.3	13.7
Chesson et al	2004	8.2	9.1	17.3
Owusu-Edusei et al	2013	3.4	14.1	17.4

Siegel 1997 estimated prevalence costs
All other studies estimated incidence costs

Direct medical costs and productivity costs per gonococcal infection



Costs updated to 2018 US dollars using medical and all-items component of CPI. Lifetime direct medical cost per case obtained from Owusu-Edusei et al, Sex Transm Dis 2013. Treatment of acute infection obtained from Owusu-Edusei et al, Sex Transm Dis 2010. Productivity cost obtained from Owusu-Edusei et al, Sexual Health, 2013, and are limited to

Components of the economics burden of STIs

- **Costs of treating STIs and sequelae**
  - Direct medical costs
  - Direct non-medical costs
    - Example: transportation to/from STI clinic
- **Costs of STI prevention**
  - Examples: STI screening, cervical cancer screening, HPV vaccination
- **Productivity costs**
- **Intangible costs**
  - Pain and suffering
  - Behavior change to avoid STIs

SYPHILIS MADE SHATNER STAR

Posted on Aug 25, 2008 @ 11:51AM

According to a former costar, a STD led to **William Shatner** becoming a star.

Christopher Plummer was about to perform **Shakespeare**'s *Henry V* in 1956 when he paid the price for a steamy one night stand.

In new tell-all, *In Spite of Myself*, Plummer wrote that when he awoke after his romp, "I started to whimper like a whipped dog.

Economic burden of STIs: Recommendation to Committee

- **Published estimates available for direct medical cost burden**
  - Division of STD Prevention plans to update in 2020
    - Not necessary for NASEM report to duplicate this effort
- **NASEM report could instead focus on other components of economic burden of STIs**
  - Prevention costs
    - Illustrate how prevention costs can offset direct medical costs
  - Intangible costs of STIs
    - Burden can be discussed even though quantitative studies are lacking

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Effective Interventions to Reduce Sexually Transmitted Disease: Introduction to the Special Issue

Thomas A. Peterman, MD, MSc and Marion W. Carter, PhD

Sexually Transmitted Diseases • Volume 43, Supplement 1, February 2016

OPEN

The Use of Mathematical Models of Chlamydia Transmission to Address Public Health Policy Questions: A Systematic Review

Minttu M. Rönn, PhD, Emory E. Wolf, BSc,* Harrell Chesson, PhD,† Nicolas A. Menzies, PhD,* Kara Galer, MPH,* Rachel Gorwitz, MD, MPH,† Thomas Gift, PhD,† Katherine Hsu, MD, MPH,‡ and Joshua A. Salomon, PhD**

American Journal of Epidemiology

Vol. 188, No. 3
DOI: 10.1093/aje/kwy272
Advance Access publication:
January 4, 2019

Practice of Epidemiology

The Impact of Screening and Partner Notification on Chlamydia Prevalence and Numbers of Infections Averted in the United States, 2000–2015: Evaluation of Epidemiologic Trends Using a Pair-Formation Transmission Model

Minttu M. Rönn*, Ashleigh R. Tuite, Nicolas A. Menzies, Emory E. Wolf, Thomas L. Gift, Harrell W. Chesson, Elizabeth Torrone, Andrés Berruti, Emanuele Mazzola, Kara Galer, Katherine Hsu, and Joshua A. Salomon

Impact and cost-effectiveness analyses: Recommendation to Committee

- **One main charge to Committee is to analyze current public health strategies and programs to prevent and control STIs**
- **Analyses of impact and cost-effectiveness of STI prevention interventions can contribute to this assessment**
  - Inclusion can be facilitated by existing literature reviews
  - Consolidation of reviews might be helpful, with inclusion of omitted studies

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Summary of studies examining impact of STI prevention funding on STI incidence

Data examined	Main findings
State-level CDC funding allocations for STI prevention and state-level chlamydia and gonorrhea rates, 1981-2016[1]	Greater amounts of prevention funding in a given year were associated with lower STI/HIV incidence rates in subsequent years
State-level CDC funding allocations for STI and HIV prevention and state-level gonorrhea rates, 1981-1998[2]	
State-level CDC allocation for syphilis elimination activities and state-level syphilis rates, 1997-2005[3]	
County-level public health spending and county-level gonorrhea and syphilis rates in California, 2003-2012[4]	Greater amounts of public health spending in a given year were associated with lower gonorrhea and syphilis incidence rates in subsequent years

1 Williams et al., Am J Prev Med 2019; 2 Chesson HW et al., Eval Rev 2005.; 3 Chesson & Owusu-Edusei, Soc Sci Med 2008 ; 4 Gallet C. Int Adv Econ Res 2017

Evidence of association between STI prevention funding and reduced STI incidence: Recommendation to Committee

- **NASEM report could highlight existence of evidence of linkage between STI prevention funding and reduced STI incidence**
  - Note strengths and weaknesses of these studies
    - These “macro” level studies can supplement “micro” level studies
  - Propose additional approaches to assess impact of STI prevention and to build the business case for STI prevention

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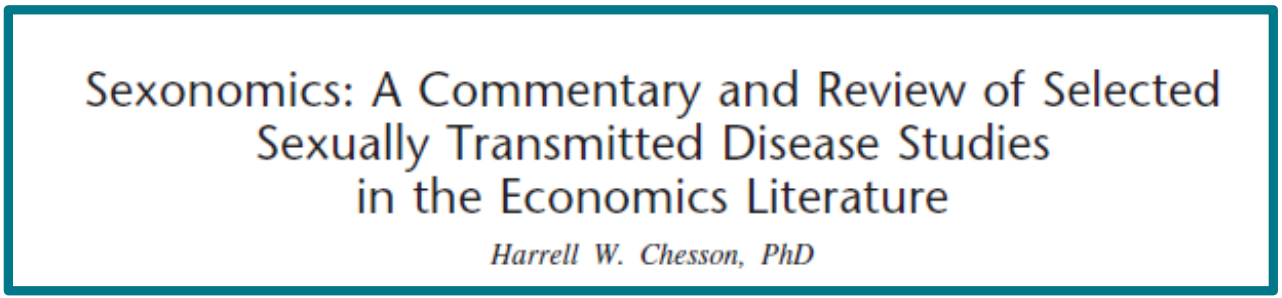
Health economics studies in the field of STIs

- **In addition to cost and cost-effectiveness studies, economists have examined numerous other STI-related topics**
  - One key theme is that the "cost" of risky sex affects the "demand" for risky sex


Sexonomics: A Commentary and Review of Selected Sexually Transmitted Disease Studies in the Economics Literature

Harrell W. Chesson, PhD

Chesson, Sex Transm Dis 2012

Selected STI/HIV topics examined by economists

- Alcohol policy and STI rates
- Same-sex marriage and syphilis rates
- HIV disclosure laws
- Discounting the future
- Concentration of risky sexual behaviors
- Abortion laws and sexual health outcomes
- Penicillin and the sexual revolution
- Other public policy analyses

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Can Alcohol Taxes Impact STI Rates?

Debate

STD Prevention Conference

Atlanta, 2016

Yes

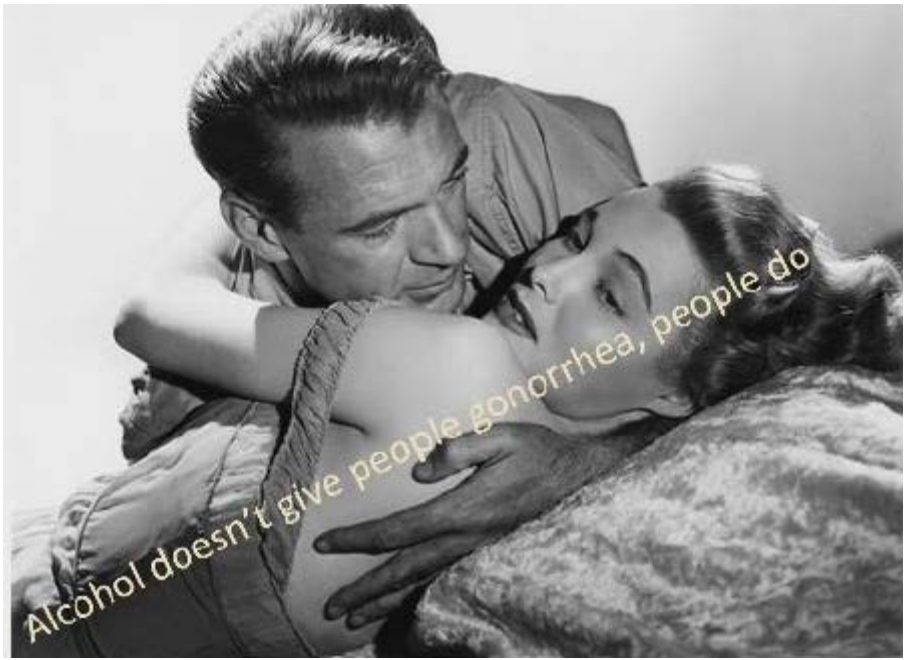
Alcohol taxes can affect STI rates

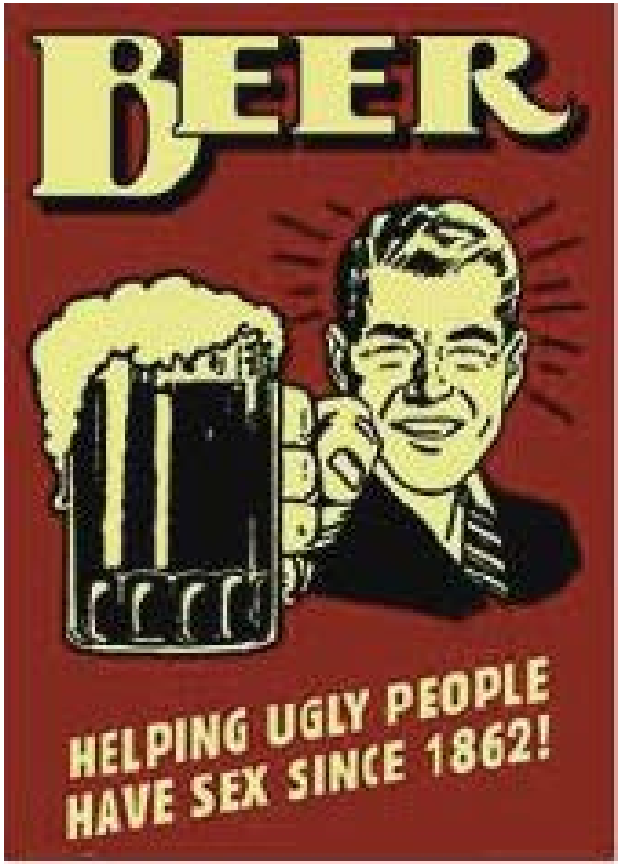
David Jernigan, PhD

No

Alcohol taxes do not affect STI rates

William (Bill) C. Miller, MD, PhD, MPH


Alcohol doesn't give people gonorrhea, people do


BEER
HELPING UGLY PEOPLE
HAVE SEX SINCE 1862!

Potential effects of alcohol tax increase

- **Well-established evidence that taxes reduce drinking**
- **Well-established that taxes reduce alcohol-related disease and traffic crashes**
- **Reasonable to conclude that alcohol taxes can prevent STIs, including HIV**

Not just STDs but…

Alcohol tax increases have been found to reduce:

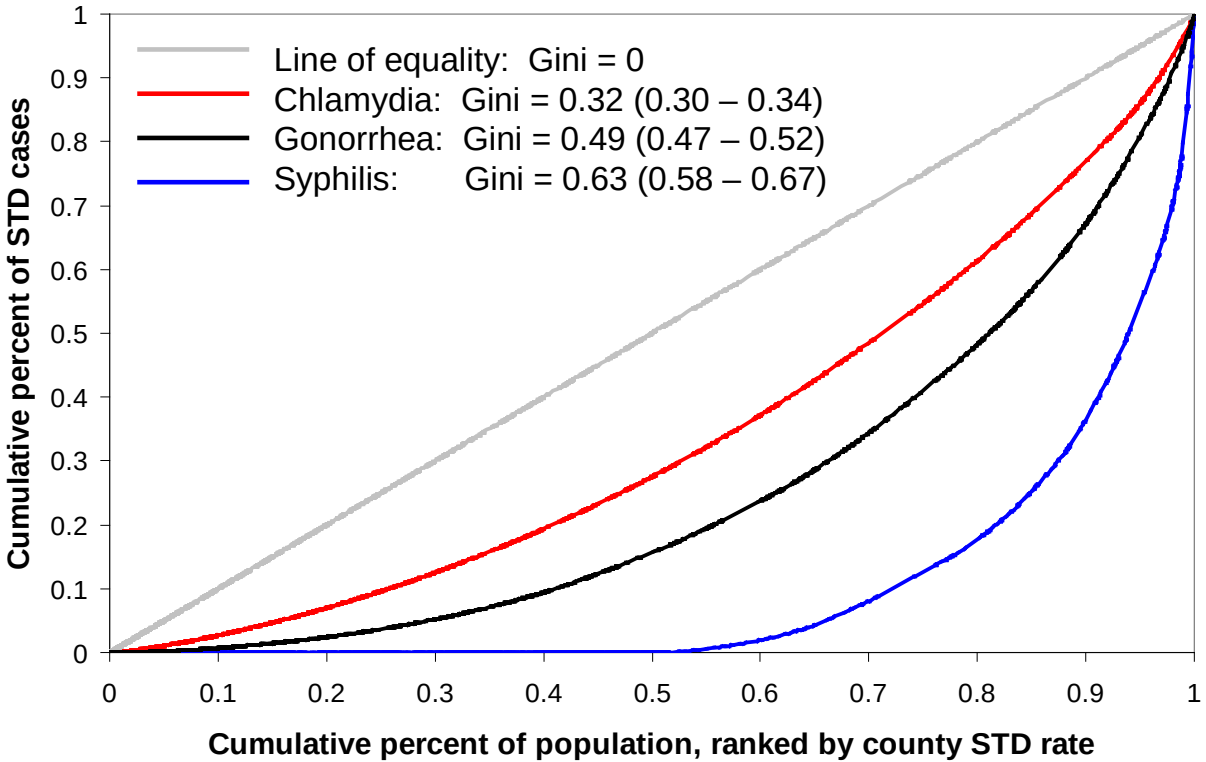
- Liver cirrhosis
- Delirium tremens
- Male suicide
- Criminality
- Hospitalizations
- Alcohol-related disease mortality
- Workplace injuries
- IPV
- Rape
- Robbery
- Severe violence towards children

Same-sex marriage laws and syphilis rates

- **Dee (2008) examined changes in legal recognition of same-sex couples in European nations between 1989 and 2003 and incidence of STIs**
  - Evidence that legal recognition of same-sex couples reduced syphilis rates among MSM
- **Francis and colleagues (2011) offer evidence consistent with Dee**
  - Examined impacts of state-level bans on same-sex marriage in US
  - Same-sex marriage bans associated with
    - Reduced tolerance for gays
    - Increases in syphilis rates

Dee TS, Econ J 2008; Francis AM et al, Emory Law and Economics Research Paper 11-97 (2011).

Lorenz curves showing distribution of STDs across counties



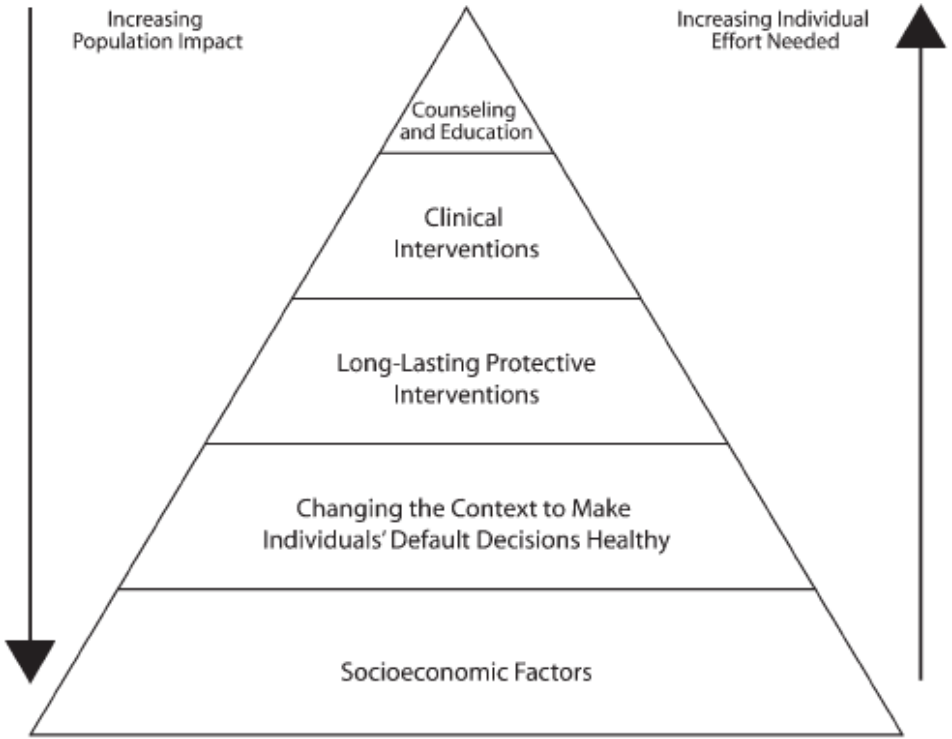
Chesson et al, Sex Transm Infect 2010

Concentration of Vaginal Sex Acts in Past Month, Ages 15 to 44

- **5% of the population with the highest number of vaginal sex acts accounted for more acts than the bottom 50% of the population with the lowest number of vaginal sex acts**
  - Example: 100 people
    - The 5 most active people have 135 sex acts
    - The 50 least active people have 45 sex acts

Leichliter et al, Sex Transm Inf 2010

Frieden's health impact pyramid (2010 AJPH)



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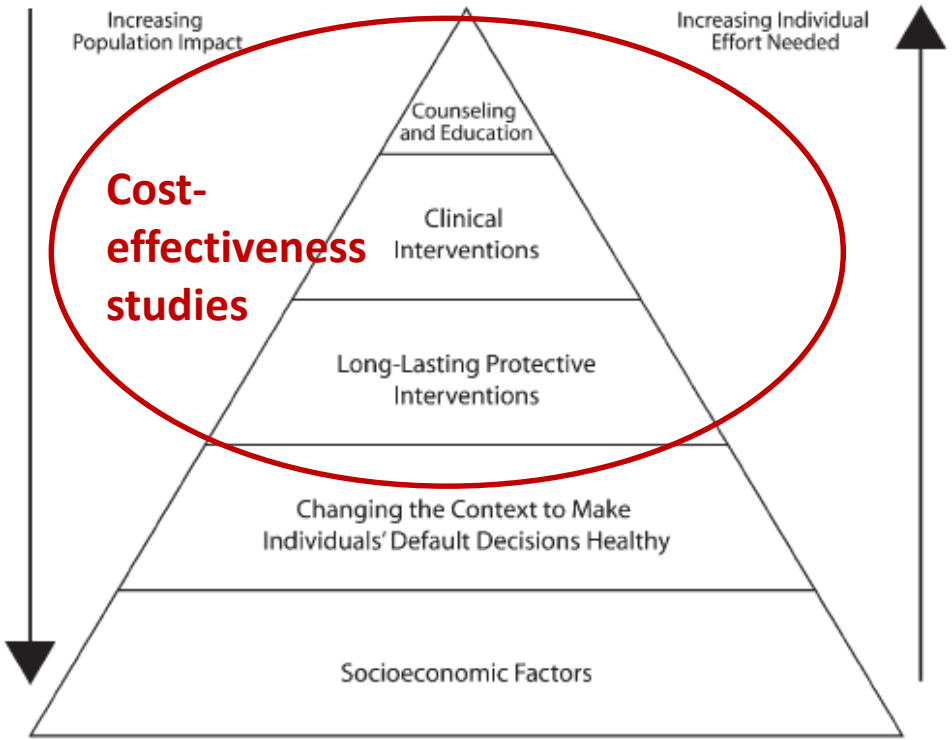

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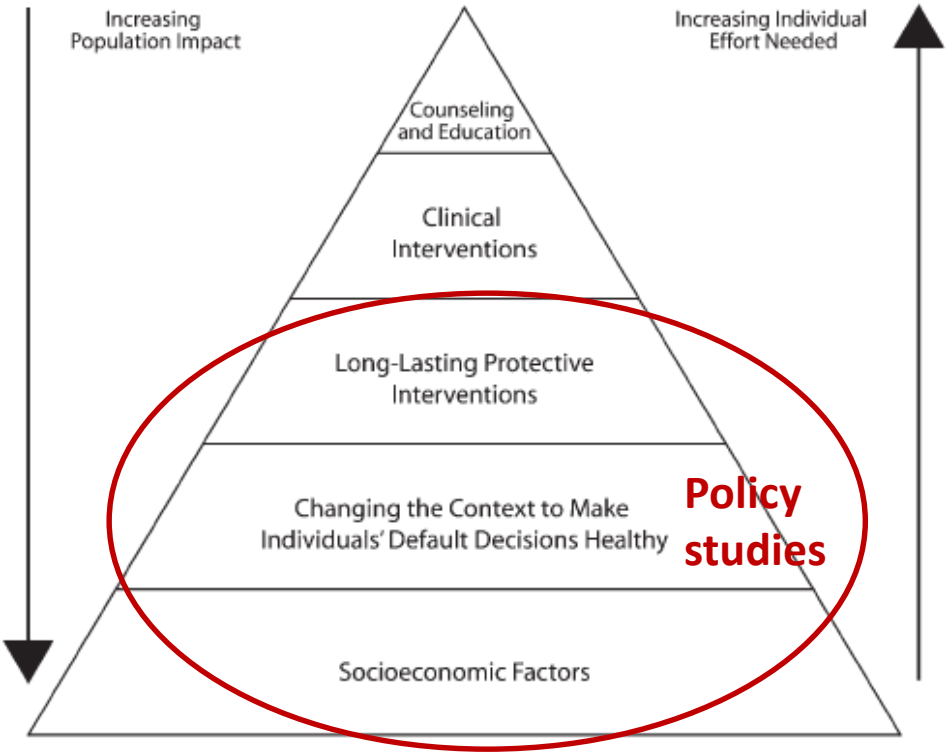

“Sexonomics” policy analyses
Recommendation to Committee

- **Review key health economic studies of policies that affect sexual behavior and STI rates**
  - Importance of “Health Impact Pyramid”
- **Highlight critical gaps in this literature**

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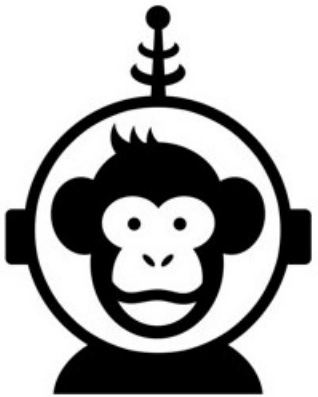
SPACE Monkey and STIC Figure are Excel-based tools

- **SPACE Monkey helps STI prevention programs to estimate the impact of changes in their budget**
  - Incidence of STIs
  - Cost of STIs
- **STIC-Figure allows STI prevention programs to estimate the economic impact of their program activities**
  - Direct medical costs averted

SPACE stands for **S**TD **P**revention **A**llocation **C**onsequence **E**stimator
STIC stands for **S**exually **T**ransmitted **I**nfection **C**osts

S.P.A.C.E. MONKEY 1.1

STD Prevention Allocation Consequence Estimator



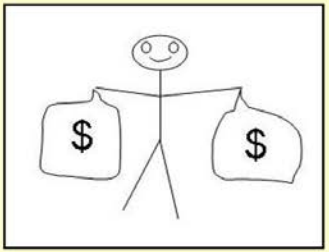
Click to Begin

A tool for Sexually Transmitted Disease (STD) prevention programs to estimate the impact of changes in their budget.

The methods applied in, and the results produced by, this spreadsheet reflect the views of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

STIC Figure 1.1

Sexually Transmitted Infection Costs saved



Click to begin

This spreadsheet provides estimates of the medical costs and indirect costs (lost productivity) saved by STD program activities.

The methods applied in, and the results produced by, this spreadsheet reflect the views of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Health economic tools for STI programs: Recommendation to Committee

- **Report could highlight available tools**
  - Note pros and cons of tools
  - Need to updated
- **Propose additional tools that could help STI prevention programs**

What the NASEM report can contribute to our understanding of the economics of STI prevention

- **Focus on components of economic burden of STIs besides or in addition to direct medical costs**
- **Assessment of current state of evidence for impact and cost-effectiveness of STI prevention interventions**
  - Recommendations for additional studies
- **Guidance in how to assess of the value of STI prevention**
- **Recommendations about how to make the business case for STI prevention**
  - Impact measures that should be collected

Thank you

Hbc7@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov