Healthier, safer, longer, and more productive lives worldwide
Factors that affect health

Socioeconomic Factors

Changing the Context

Individuals making healthy choices

Long-lasting Protective Interventions

Clinical Interventions

Counseling & Education

Examples from global health

- Poverty; education; housing; inequality
- Vaccines; mass drug Rx for tropical diseases; IRS; bed nets; circumcision
- Clean air & water; control of toxic substances; food & drug safety; safe roads
- Treatment for infectious disease (HIV, TB, etc.); Rx for htn, diabetes, etc.
- Education on infant care; instruction on water sanitization, condom use

Largest Impact

Smallest Impact
Winnable battles to promote global health today

• Achieve and sustain global immunization initiatives, including polio eradication

• Substantially reduce mother-to-child HIV transmission and congenital syphilis globally

• Eliminate lymphatic filariasis in Americas

• Tobacco control

• Motor vehicle injury prevention
Prevention is a best buy

- Healthier communities are more productive
- Prevention increases health value from health dollars
- Prevention can reduce per capita annual health care costs
Preventing deaths through access to clean water and sanitation

• 1 billion people worldwide have no access to clean drinking water, 2.5 billion have no access to adequate sanitation

• Every dollar invested in sanitation is returned nearly ten-fold in economic benefits

• Household-based water treatment and water storage interventions are more effective and cost-effective in preventing diarrhea than interventions at the source

• Treating drinking water with chlorine reduces risk of childhood diarrhea by 30%

Nearly 2 million people – most of them children – die every year from diarrheal diseases associated with unsafe drinking water and inadequate sanitation. Areas proportional to number of diarrhea deaths.
HIV testing and linkage to care as a prevention strategy

- More than half of new HIV infections are transmitted by people who do not know their status.
- People who know their HIV status are, in general, more likely to reduce risky behaviors.
Knowledge of HIV status among HIV-infected people

Results from the Kenya AIDS Indicator Survey

- 16% knew they were positive
- 56% never tested for HIV
- 28% reported last HIV-test negative
- 84% of HIV-infected adults did not know their status

Denominator: Lab-confirmed HIV infected participants
(2% missing data on HIV testing history or known HIV status; 1% chose not to disclose status)
Prevention benefits of male circumcision

• Conclusive evidence of a 60% reduction in HIV acquisition by men receiving male circumcision
  • Modeling exercises suggest that one HIV infection could be averted for every four circumcisions (in high HIV prevalence, low male circumcision country)
  • Only one PEPFAR country (Kenya) has moved to widespread implementation

• To achieve full prevention impact, must ensure
  • Men who test HIV positive are linked to treatment/care
  • Female partners are tested, counseled, linked to treatment if HIV infected
  • HIV serodiscordant couples are linked to ongoing services
Observational study of prevention benefit of HIV antiretroviral treatment

Transmission rates (per 100 person-years)

- Heterosexual couples without ARV: 2.24
- Heterosexual couples with ARV: 0.37

Adjusted incidence rate ratio is 92% less
(Unadjusted ratio is 83% less)

Transmission to uninfected partner

Preventing mother-to-child HIV transmission saves lives globally

1.4 million HIV-infected women become pregnant in 2009

- Significant progress, but still far to go
  - Only ~53% of pregnant women w/ HIV receive ARVs
  - ARVs can reduce MTCT from 35% to <5%
- Potential to virtually eliminate pediatric HIV/AIDS with increased coverage

Infections prevented: 180,000
Infants born with HIV: 269,000

Assumes ~1/3 transmission rate without intervention
Malaria prevention

- Malaria kills up to 1 million people/year
  - Mostly young children in sub-Saharan Africa
  - 2nd leading cause of death from infectious disease in Africa (after HIV/AIDS)
- ~US$12 billion per year in direct medical costs
  - Productivity losses several times higher
Insecticide-treated bed nets save lives

Under-5 all-cause mortality in Western Kenya with high malaria transmission

• ITNs reduce all-cause death rates in young children
  • Especially infants <1 year
  • Reductions continue through age 5
• ITNs have 20% protective efficacy in infants <1 year

Preventing childhood pneumonia deaths

- Exclusive breastfeeding for first 6 months reduces pneumonia incidence 15-23%
- Reduce indoor air pollution
  - Solid fuels contribute ~30% to pneumonia burden
- Hib and pneumococcal conjugate vaccines
  - Cost per death averted as low as US$10
- Effective treatment
  - Community case management reduces pneumonia deaths by 36-42%

1,575,000 children <5 years die of pneumonia each year
52% of deaths in 5 countries: India, Nigeria, Congo, Afghanistan, Pakistan

Accelerated use of key interventions could prevent 67% of child pneumonia deaths by 2015
Cost benefits of TB prevention

Cost of treating drug-susceptible TB patient in India: $10
Cost of treating MDR-TB patient in the US: >$500,000
Global distribution of tropical diseases

Affect >1 billion people worldwide

World Health Organization

Drugs to prevent transmission cost about 50 cents per year per person
Education and lymphedema management programs increase mass drug administration compliance

Percent compliance with medication:

- Community-based pre-MDA LF education + lymphedema management: 90%
- Community-based pre-MDA LF education only: 75%
- Usual MOH pre-MDA campaign: 53%
- No intervention: 42%

LF education program includes: education about mass drug administration; who should take it, potential side effects; transmission and prevention of LF; mosquito control

For the first time in global history...

- More people live in urban than rural areas
- There are more people who are overweight than underweight
- There are more deaths among adults than children
- Higher rates of NCDs in developing than developed countries
Non-communicable diseases in the developing world

- NCDs now kill more people globally than infectious disease
- NCD burden has risen rapidly and is a major threat to economic and social development
- By 2020, NCDs will kill almost 4x as many people globally as infectious disease
- Will affect the poor most heavily, who die at earlier ages
40 years ago, there were a similar number of deaths among children and young/middle-aged adults. Today there are more than 3 times as many deaths among young/middle-aged adults as among children.
Non-communicable disease kills far more people than infectious disease – even in low-income countries

People in poorer countries are more likely to die prematurely from NCDs than people in wealthier countries.
Tobacco is now the world’s leading single agent of death.

Tobacco kills more people worldwide each year than HIV, TB and malaria combined.
Tobacco control interventions are proven to work... yet few countries use them.

Tobacco control is generally cost-effective... and is the single most important intervention to reduce non-communicable disease.
Monitor tobacco use and prevention policies

Protect people from tobacco smoke

Offer help to quit tobacco use

Warn about the dangers of tobacco

Enforce bans on tobacco advertising, promotion and sponsorship

Raise taxes on tobacco
No one MPOWER policy has yet been comprehensively implemented to cover even 10% of the world’s people.
Evidence-based tobacco control interventions in NYC

- Monitor adult smoking prevalence
- Protect people from tobacco smoke
- Warn about the dangers of smoking
- Raise taxes on tobacco (City & State)
- Monitor youth smoking

- 350,000 fewer adult smokers
- >100,000 fewer smoking-related deaths in future years

% of New York City Smokers

MPOWER interventions reduced smoking prevalence in Uruguay

- One of the sharpest declines ever reported
  - Only 2 data points
- Coordinated package of interventions
  - Smoking ban (first country in Americas to go 100% smoke-free)
  - Comprehensive ad ban
  - Large pictorial warning labels
  - Cessation services
  - High taxes

Data: Global Adult Tobacco Survey

1 in 4 smokers quit
Community prevention saves many more lives, at much lower cost, than clinical prevention.

### Intervention Costs

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Cost per smoker who quits</th>
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<tbody>
<tr>
<td>Clinical care</td>
<td>~$4000</td>
</tr>
<tr>
<td>Quit lines</td>
<td>~$400</td>
</tr>
<tr>
<td>Anti-tobacco ads</td>
<td>~$100</td>
</tr>
<tr>
<td>Smoke-free laws</td>
<td>~$0</td>
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<tr>
<td>Increased taxes</td>
<td>Revenue of $250 or more</td>
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### Reason for Quitting

- **Taxes**: 43%
- **Other/ Synergies**: 28%
- **Free NRT**: 8%
- **SF Law**: 9%
- **Taxes + SF Law**: 12%

Intervention | Cost per smoker who quits |
-------------|---------------------------|
Clinical care | ~$4000                    |
Quit lines    | ~$400                     |
Anti-tobacco ads | ~$100                   |
Smoke-free laws | ~$0                     |
Increased taxes | Revenue of $250 or more |

Intervention costs and reasons for quitting.
Road Traffic Safety
The next winnable battle in public health

• Large and growing burden
  • Road traffic accidents kill >1.2 million, injure up to 50 million annually worldwide
  • Epidemic is still increasing in most parts of the world

• Legal interventions are proven effective
  • Relatively inexpensive and highly cost-effective
Road traffic injuries to be 5th leading cause of death globally by 2030

2004 (actual)

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</tr>
<tr>
<td>5</td>
<td>Diarrhoeal diseases</td>
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</tr>
<tr>
<td>6</td>
<td>HIV/AIDS</td>
<td>3.5</td>
</tr>
<tr>
<td>7</td>
<td>Tuberculosis</td>
<td>2.5</td>
</tr>
<tr>
<td>8</td>
<td>Trachea, bronchus, lung cancers</td>
<td>2.3</td>
</tr>
<tr>
<td>9</td>
<td>Road traffic injuries</td>
<td>2.2</td>
</tr>
<tr>
<td>10</td>
<td>Prematurity and low birth weight</td>
<td>2.0</td>
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2030 (projected)

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Road traffic crashes currently cause more than 1.2 million deaths a year – but by 2030 will kill an estimated 2.4 million people per year.
Road traffic fatalities disproportionately affect younger people

*Top 3 leading causes of death globally, people age 5-44*

<table>
<thead>
<tr>
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<th>15–29 YRS</th>
<th>30–44 YRS</th>
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<td>Violence</td>
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**Rank among other age groups**

- 0-4 yrs: #14
- 45-69 yrs: #8
- 70+ yrs: #20
Road traffic death rates twice as high in low-income countries

Per 100,000 population

- Low-Income: 21.5
- Medium-Income: 19.5
- High-Income: 10.3

>90% of world’s traffic deaths occur in low/middle-income countries – despite these countries having less than half of the world’s registered vehicles
Evidence-based interventions

Only 15% of countries have sufficiently comprehensive road safety laws covering all five main safety risk factors

- **Drunk driving** – 0.05% BAC limit
- **Seatbelts** – drivers and passengers
- **Child restraints** – age/weight limits; safety standards
- **Helmets** – riders and passengers (also bicycles); safety standards
- **Speed limits** – under 50 km/h in urban areas
Other key road traffic safety interventions

- Injury surveillance systems
  - Critical to determining extent/location of problem
- Safer roads and vehicles
  - Including separation of motor vehicle and pedestrian/bicycle traffic
- Reduce highway speed
- Graduated drivers licenses for youth

U.S. road traffic fatality rates declined sharply beginning in 1966 with establishment of federal motor vehicle and highway safety standards
Cardiovascular disease is the leading cause of death globally

- Worldwide in 2003, CVD caused 17 million deaths (~30% of total)
  - Leading cause of death among people aged 60+, second among those aged 15-59
  - Leading cause of death in the developing world (with exception of sub-Saharan Africa)
- Half or more of all strokes and heart attacks globally attributable to high blood pressure
- Disproportionately affects working-age adults of lower socioeconomic status
Heart disease and stroke will continue to kill the most people worldwide

Proportion of people worldwide who die from heart disease and stroke is unlikely to change over the next two decades.

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Global deaths attributable to leading risk factors (2000)

- High blood pressure
- Tobacco
- High cholesterol
- Underweight
- Unsafe sex
- High BMI
- Physical inactivity
- Alcohol
- Indoor smoke from solid fuels
- Iron deficiency

Sodium is a leading contributor to high blood pressure

- After tobacco control, most cost-effective intervention may be reduction of sodium intake
- Reducing salt content of processed food could prevent ~14 million deaths globally over 10 years

*He FJ, MacGregor GA. J Hum Hypertens. 2002;16:761-70.*
Lower blood pressure = Lower risk

Many people with “normal” blood pressure have strokes and heart attacks

Most salt in U.S. and other developed countries comes from processed and restaurant foods.

Realistically, it is difficult for individuals to control how much salt they eat.

Source: CSPI. Adapted from: http://www.cspinet.org/salt/saltreport.pdf
Salt sprinkled on food contributes more to salty taste

In U.S., salt added at the table accounts for only 6% of total salt intake – but salt on the surface of food makes it taste saltier

- 50% reduction of salt in prepared food
- 30% decrease in total salt consumption
- Only 20% increase in table salt for taste

Table salt can make lower-salt foods taste salty enough – and reduce total sodium consumption

Successful salt reduction models

- UK set goals of ↓ salt by 1/3 in 5 yrs:
  - Heinz: 28-33% ↓ in some canned products
  - Nestle: 25% ↓ in soup
  - Kellogg’s: 25% ↓ in cornflakes
  - Kraft: 30% ↓ in cheese
- Industry initially resistant, now proud of progress
- Ireland, France, Australia, New Zealand and Finland also models

Changing from saturated to unsaturated cooking oil reduces blood cholesterol

- In 1987, government of Mauritius changed composition of commonly used cooking oil
  - Previously mostly palm oil (high in saturated fat)
  - Changed to 100% soya bean oil (high in unsaturated fat)
- By 1992, LDL cholesterol levels dropped ~30 mg/dL, HDL cholesterol levels increased 1.3 mg/dL
  - Despite an increase in obesity

Medical complications of obesity
(In addition to medical and societal costs)

- Pulmonary disease
  - asthma
  - obstructive sleep apnea
  - hypoventilation syndrome

- Nonalcoholic fatty liver disease
  - steatosis
  - steatohepatitis
  - cirrhosis

- Gall bladder disease

- Gynecologic abnormalities
  - abnormal menses
  - infertility
  - polycystic ovarian syndrome

- Osteoarthritis

- Skin

- Gout

- Idiopathic intracranial hypertension
  - Stroke
  - Cataracts

- Coronary heart disease
  - Diabetes
  - Dyslipidemia
  - Hypertension

- Severe pancreatitis

- Cancer
  - breast, uterus, cervix
  - colon, esophagus, pancreas
  - kidney, prostate

- Phlebitis
  - venous stasis

Source: Rudd Center for Food Policy and Obesity
Environments and policies that promote physical activity

• Urban design and land use to encourage physical activity as part of transportation
  • Minimize long, non-walkable distances
  • Use grid street layouts, build high-density mixed development near public transit
• Street design that makes walking and biking safe and pleasant
  • Sidewalks, bike lanes, improved lighting, trees
• Building and site design that does not favor vehicles over pedestrians
Encouraging stairwell use

- Increase accessibility
  - Don’t lock
- Improve appeal
  - Carpet, paint, artwork, lighting, music, etc.
- Visual prompts at strategic decision points
  - Can increase stair use by >50%
- Make stairwells smoke-free

Burn Calories, Not Electricity

Take the Stairs!

Walking up the stairs just 2 minutes a day helps prevent weight gain. It also helps the environment.
Global cancer prevention

- ~8 million global cancer deaths each year
  - 10 million/yr by 2020 if no action is taken
  - Nearly half of cancer is preventable (tobacco, healthy diet, physical activity)
- Strengthen tobacco control
  - 1.5 million tobacco-caused cancer deaths per year
- Improve vaccine coverage
  - 650,000 deaths/yr from liver cancer
- Expand colorectal and cervical cancer screening
  - 650,000 colon cancer deaths and 225,000 cervical cancer deaths/yr
- Address availability and price of alcohol
  - 300,000 alcohol-related cancer deaths/yr
- Increase fruit/vegetable consumption
  - Could prevent up to 1 million cancer deaths/yr
Prevention

- Break the cycle of transmission of HIV and other communicable diseases
- Prevent NCDs
  - Tobacco control, sodium reduction, healthy oils
  - Changes to food and physical environments
  - Regulatory and policy interventions and enforcement to improve road traffic safety
- Improved clinical care for NCDs
  - Community interventions more cost-effective than clinical care
The attention of the world was rightfully on the rescue of the 33 miners trapped in Chile.
Millions die worldwide each year from preventable diseases

Imagine if the global impact of prevention programs – which could save millions of lives a year – received a proportional amount of attention.
Thank you!