
Global Progress in Child Mortality due to Malaria

— Zaira Ordoubadi, CPSC 229 —

What is Child Mortality?

- WHO: “The death of children under 5” (note: any cause)
→ encompasses infant mortality (≤ 1 year of life)
- Child mortality rate: incidence of child death per 1,000 live births



World Health
Organization

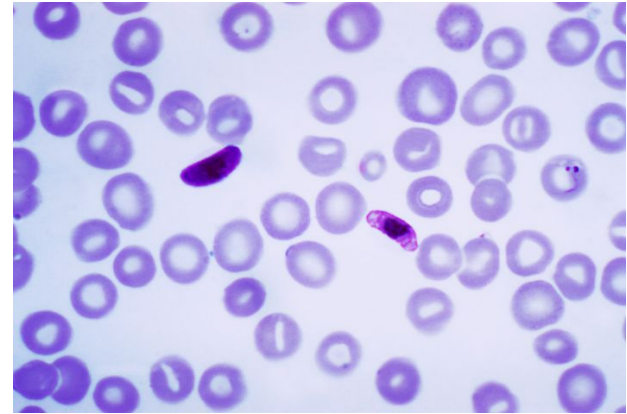


unicef

BILL &
MELINDA
GATES
foundation

What is Malaria?

- Infectious disease caused by the *Plasmodium* parasite
- Most common/deadly = *P. falciparum*
- Transmitted to humans via mosquito bite
- Common in tropical climates
- Symptoms: high fever, chills, abdominal pain, diarrhea
- When severe: cardiovascular failure, hemolysis, & death
- Children + pregnant women especially susceptible!



Plasmodium falciparum parasite among pts red blood cells



Methods of Prevention

- **DON'T GET BIT!**

→ Mosquitoes most active dusk-dawn

- Insecticide-treated bed nets
- Removal of standing water (destroys breeding grounds)
- Indoor Residual Spraying (IRS)
- Antimalarial drugs
- Closing windows at night
- Long sleeves/pants



Illustration: Anna Bogatyreva

At-risk populations

- **Pregnant women:**

- Hormonal changes during pregnancy dampen immunity (WHO 2018)
- New tissue growth (placenta) is an easy target for parasites
- Malaria causes anemia → leads to low birth weight & possible miscarriage

- **Young Children:**

- Small bodies
- Developing immune systems
- Outside play = exposure to standing water



Image: VectorStock.com/25180808

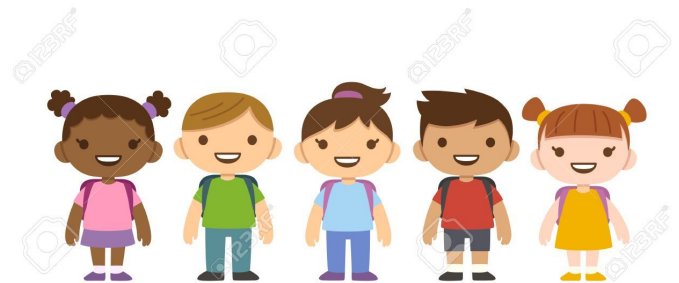


Image: Irina Mir

Prevention is key!



Photographer:
Michael
Stulman



AP News
Afghanistan,
July 2016

Loyds Pharmacy UK

Maloff
protect

Prescription strength
antimalarial protection

Now available without
a prescription



CNN
News
2016,
Inti
Ocon/AFP
/Getty
Images

Why This?



United Nations General Assembly
Headquarters, NY

Chris Melzer, 2015

- Personal interest in global health & curiosity by a former Model-UN kid
- Applying to medical school next year (yikes)
- Interest in infectious disease/lessening childhood suffering
- Time period of 2000-2015 = Millennium Development Goals

The Data...

- Collected from United Nations Open Database / data.UN.org
- “Child Health Malaria Cause-of-death Feb 2018 WHO Report”

→ virtually ALL data is accessible as UN declares right to information a personal freedom
- ~**3,300 entries** tracking **193 countries** from 2000-2016 (all climates)
- Last update: **February 2018**
- Included neonatal mortality, under 5 mortality, total mortality rates, and baseline country data

My Plan...

- Select 3 countries in different regions of the world affected by malaria
 - Democratic Republic of the Congo
 - Philippines
 - Ethiopia
- Pair down data to examine progress/setbacks operationalized by malaria-related mortalities
- Compare with **GLOBAL** rates

1. Democratic Republic of the Congo

- Sub-saharan Africa
- 4th most populous country on continent
- Dry, hot temperatures + wet season make malaria a large threat
- Hotspot for international relief orgs



Wikimedia Commons 2018

2. Philippines

- Southeast Asia
- Tropical weather
- Difficult access to immediate healthcare
- Higher risk in smaller islands, very low to low risk in urban Manila



Image: BeautifulWorld Travel Guide

Ethiopia

- East Africa
- Borders Sudan/South Sudan
→ influx of refugees in past 8 years
- Greater incidence of *P. vivax* (~40% of infections) (NCBI 2016)

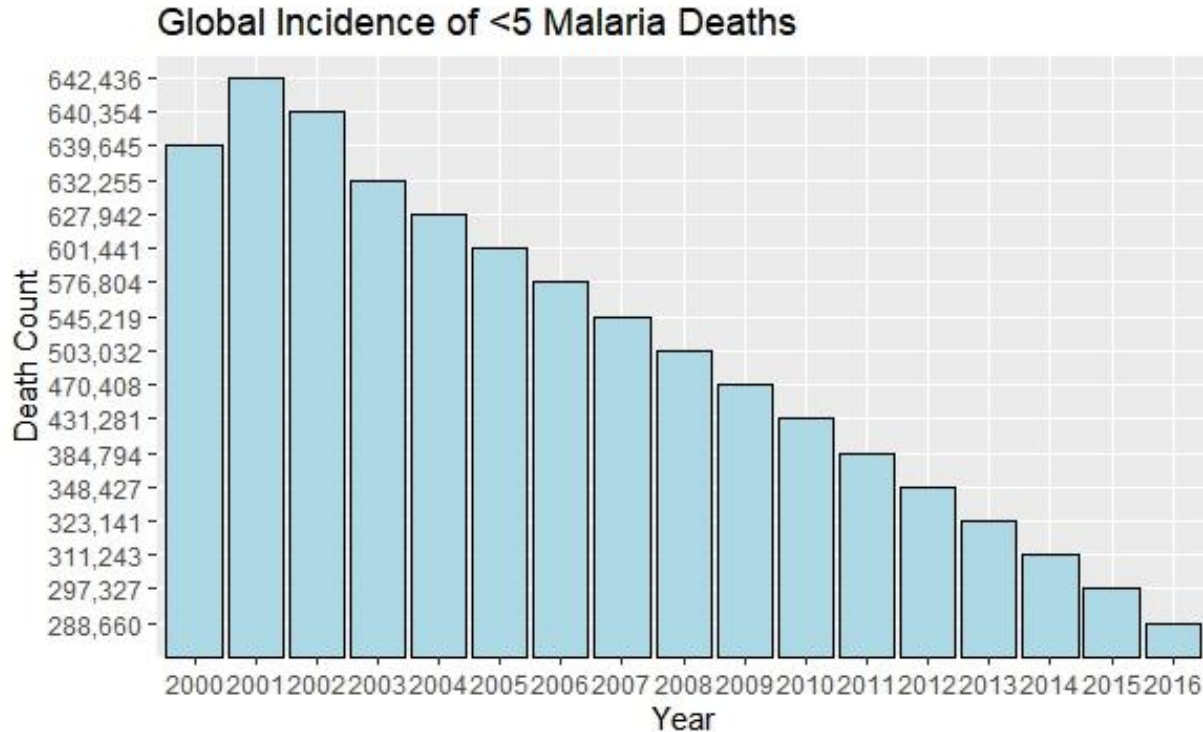


OntheWorld Maps 2019

Questions:

- Who made the most progress in reducing child death?
- How did these results compare to Global averages?
- What moderating factors might cause this decline?

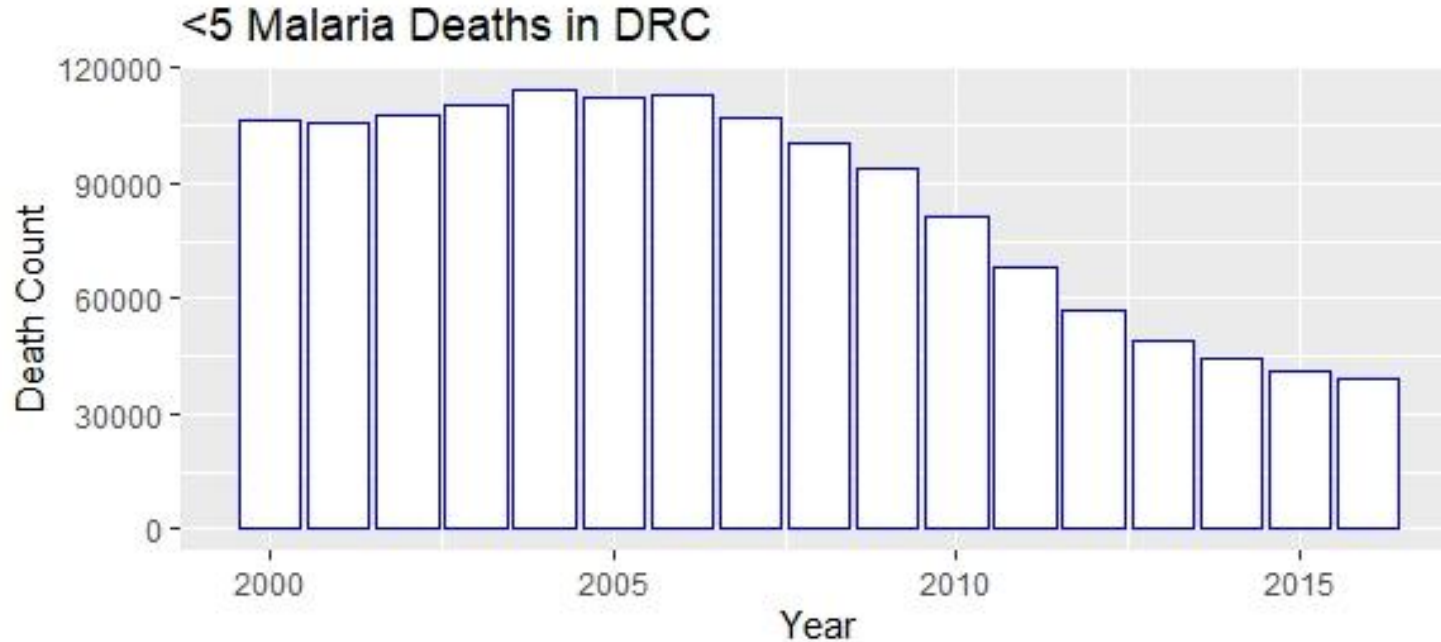
Global data



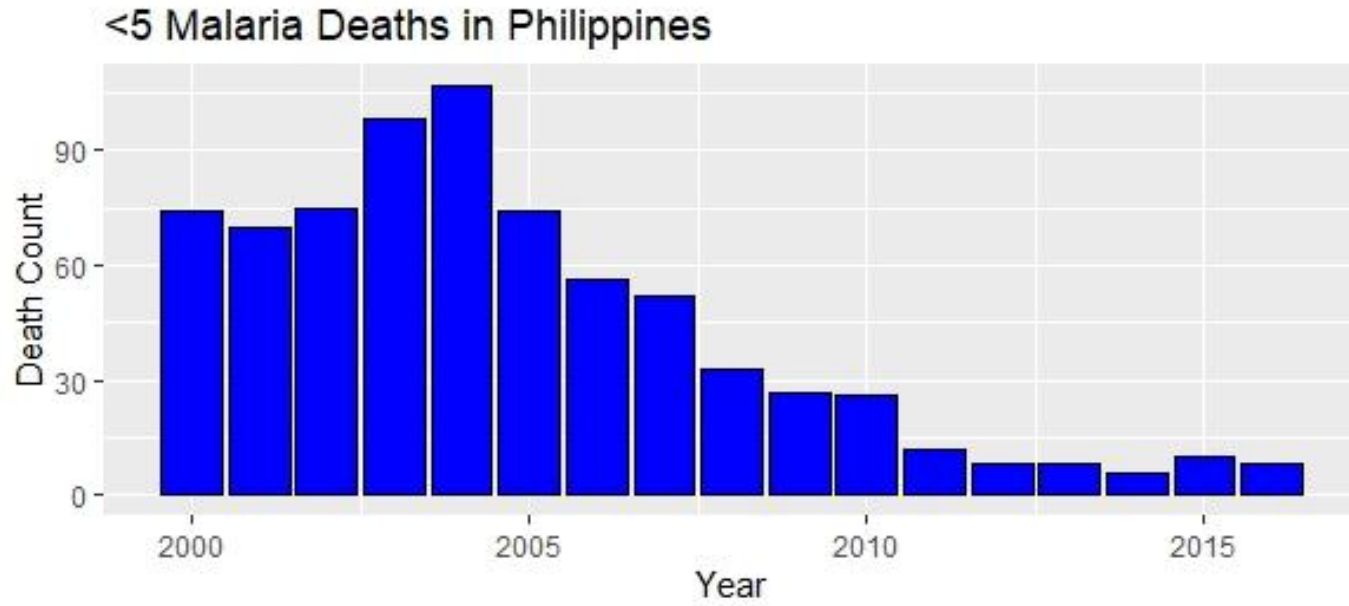
Note: Under 5 deaths make up **57% of ALL malaria deaths** (WHO 2012)

- > 50% reduction!!

Democratic Republic of the Congo

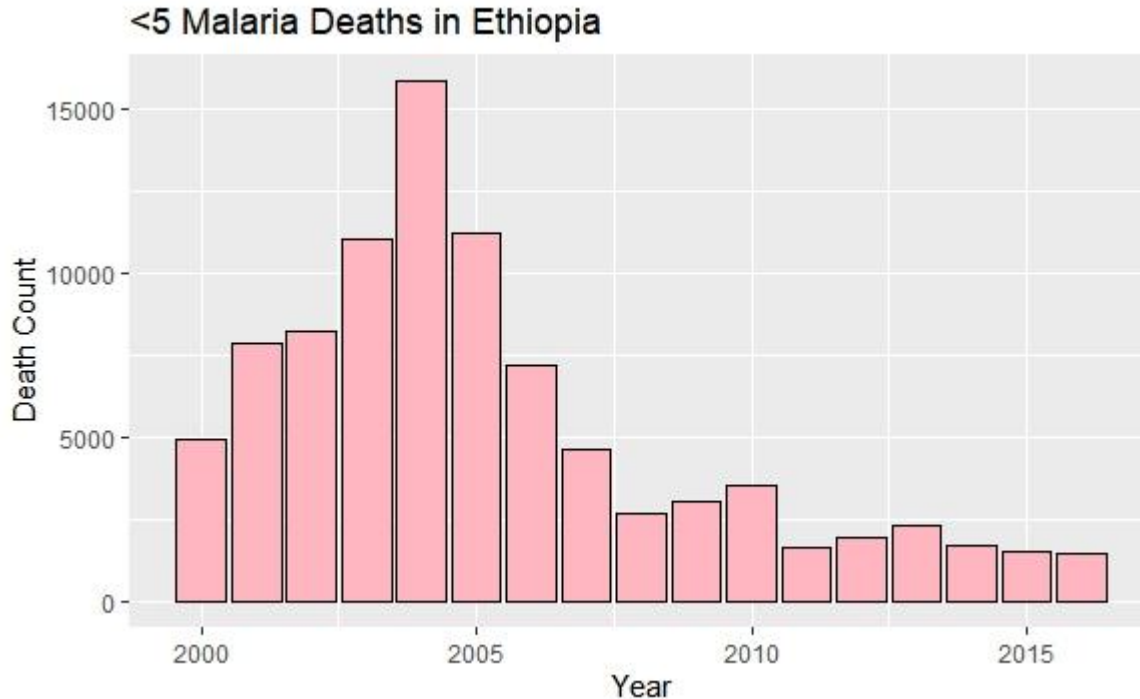


Philippines



- Note: prevalence much lower to begin with

Ethiopia



- 2004= MercyCorps starts work in Ethiopia
- 2011: Horn of Africa Famine/droughts

Challenges

- Navigating through hundreds of NAs for non-tropical countries
- Converting from the *forbidden excel files* (lots of cleaning!!)
- Country names/coding syntax in European format
- Some countries changed boundaries/names in past ~20 years

→ Zaire/Congo → DRC



Photo: Yearbook of the
United Nations

Findings/Moving forward

- Overall, DRC made most progress in death reduction, mirroring global stats
→ Nets work! (Thanks Bill!)
- **Future:**
 - Tampering w/ mosquito genome via CRISPR/Cas9 (NCBI, 2018)
 - Large-scale efforts at a malaria vaccine
 - Increasing infrastructure



Source: UN Multimedia

Sources

Images:

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CDC: https://www.cdc.gov/malaria/malaria_worldwide/reduction/iptp.html

WHO: https://www.who.int/malaria/areas/high_risk_groups/children/en/

Sources cont...

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<https://www.ncbi.nlm.nih.gov/pubmed/30295650>

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Our World In Data Malaria: <https://ourworldindata.org/malaria>

<https://www.voanews.com/science-health/malaria-carrying-mosquitoes-becoming-resistant-bed-nets-southern-africa>

MercyCorps Ethiopia: <https://www.mercycorps.org/articles/ethiopia/quick-facts-how-were-fighting-hunger-ethiopia>

Logos: Courtesy of Bill & Melinda Gates Foundation

- WHO & UNICEF: LogosDownload