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# Factors related to early treatment for malaria in the Brazilian Amazon: a multivariable approach using a ten-year population-based malaria surveillance database

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# Outline

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- Background
- Study Objective
- Methodology
- Results
- Discussion
- Conclusion



# Background

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- **Malaria in the World:**

**198 million** estimated cases of malaria

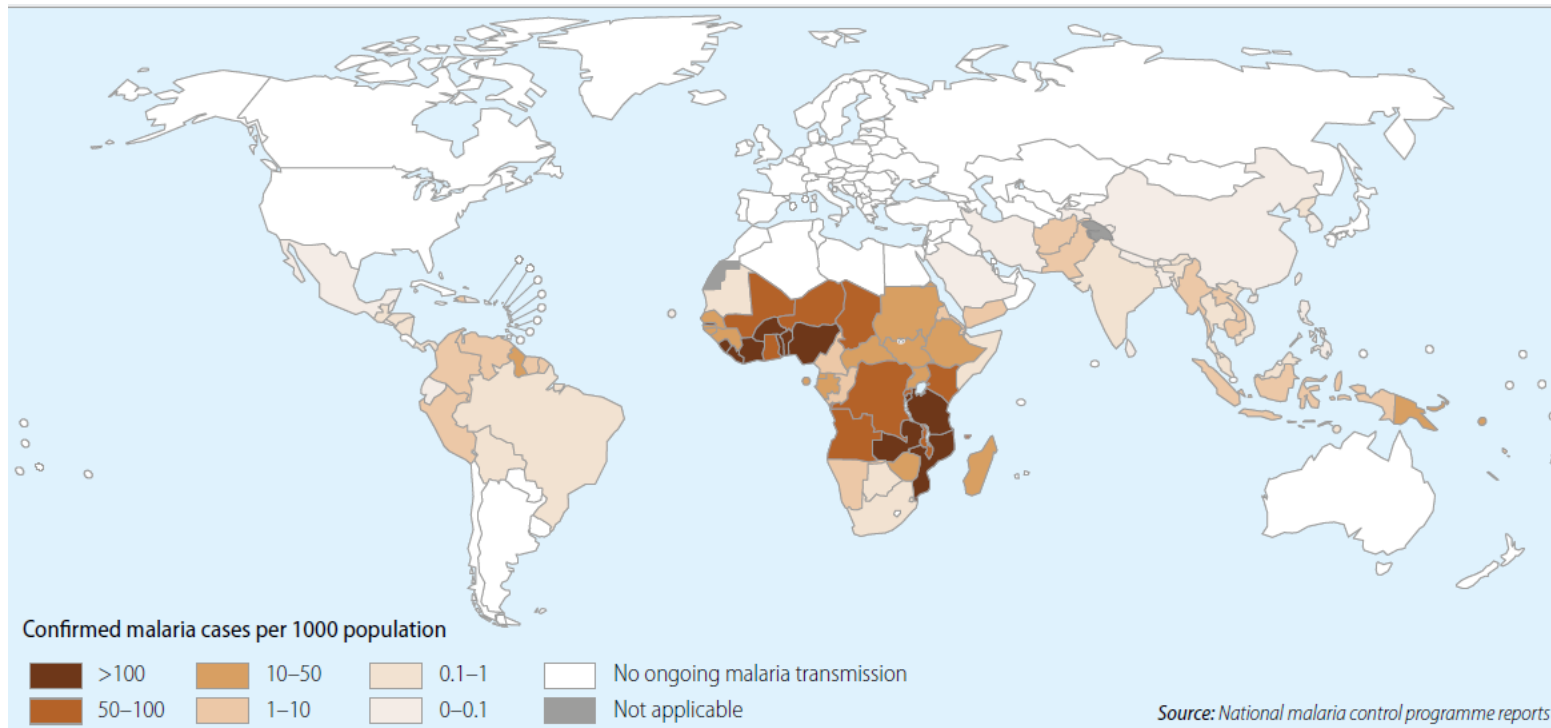
**584 thousand** estimated deaths caused by malaria

**97 countries** with ongoing malaria transmission



# Background

- **Malaria in the World:**



Source: World Malaria Report 2014, WHO



# Background

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- **Malaria in Brazil:**

**199 thousand** estimated cases of malaria

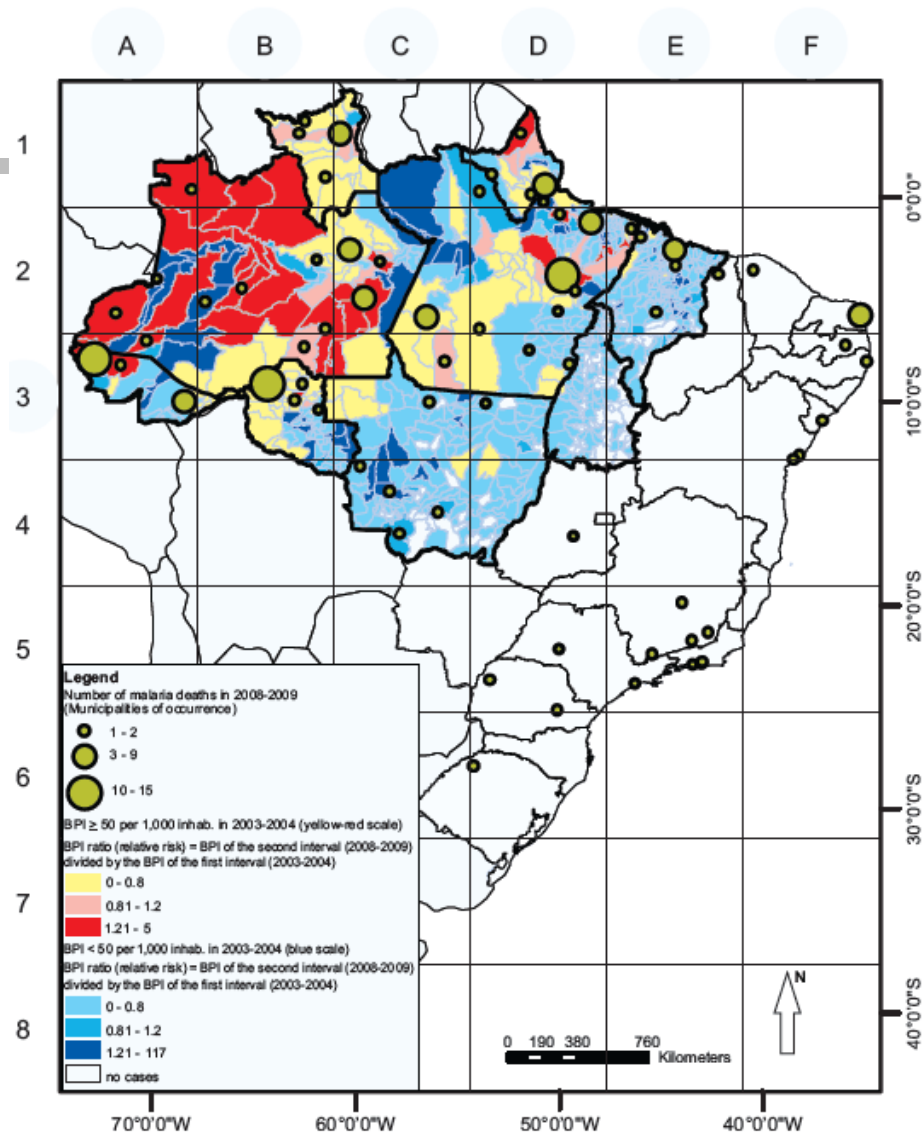
**Over 1,865** estimated hospitalizations

**40** estimated deaths caused by malaria (2013)



# Background

- Present in 9 Brazilian States
- Trend of increasing malaria in the Northwest region. (Amazônia and Acre)
- Many deaths occurred outside of the transmission areas





# Background

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- Why early treatment is important?
  - **Essentially all deaths and hospitalization** can be prevented throughout effective health care
  - Early diagnostic and adequate treatment are a way to **prevent or reduce severe stage** of the disease,
  - It's an important tool for **disease control** since it reduces the probability of mosquito bites on infected people



# Study Objective

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- To investigate factors associated with early treatment for malaria in the Brazilian Amazon

**Aim:** To provide information to the health care system and to policy-makers in order to identify high risk groups for late treatment





# Methodology

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- Data sources:
  - SIVEP-Malaria (population-based malaria surveillance database)
- Period of Study:
  - 2004 – 2013
- Approved by the health research ethics board



# Methodology

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- **Inclusion Criteria:**
  - States of Acre, Amapá, Amazonas, Pará, Rondônia e Roraima
  - Symptomatic infections
- **Exclusion criteria:**
  - Imported cases
  - Unknown treatment start date



# Methodology

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- **Statistical Methods:**
  - Exploratory data analysis
  - Pearson's correlation matrix
  - Multicollinearity analysis (VIF)
  - Bivariate analysis (model building)
  - Multivariable logistic regression



# Important Findings

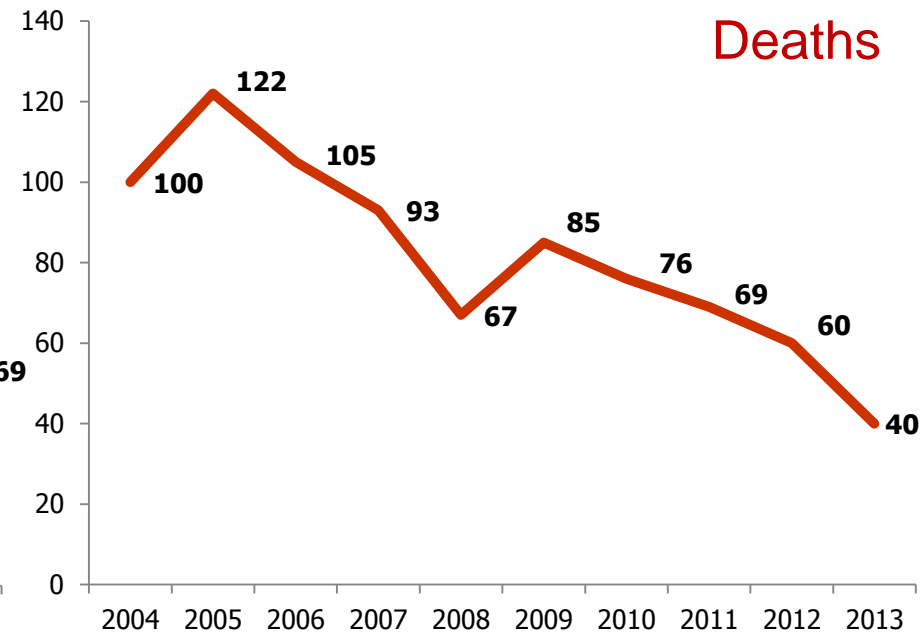
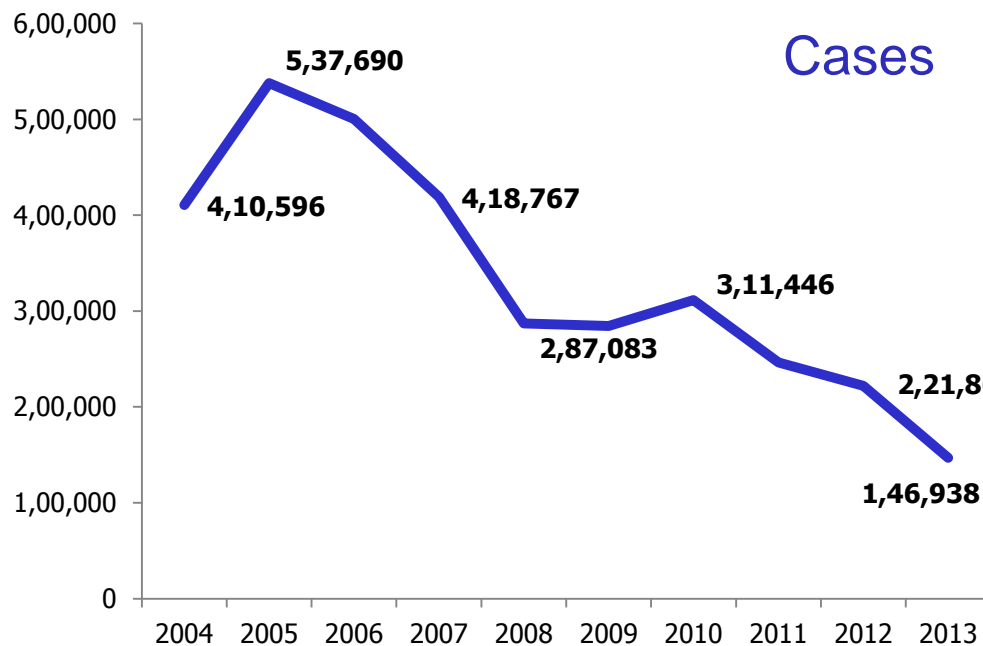
- Over 3,3 million cases of malaria during the study period
- More frequent among:
  - Males (62%)
  - 40 years-old or younger (82%)
  - Less than 8 years of formal education (82%)
  - Nearly 41% of all cases started treatment within 24 hours of symptoms



# Important Findings

- “Brazil is on the right track to achieve a 75% decrease in case incidence by 2015.”

(World Malaria Report 2014, WHO )





# Important Findings

- Factors associated with early treatment:

Factors Related to Early Treatment	Adjusted Odds Ratios*			P-value
	OR	IC 95%		
<b>Surveillance Type (Ref: passive)</b>				
Active	1,37	1,35	1,39	< 0,01
<b>Years of Formal Education (Ref: 9 or more years)</b>				
Illiterate population or less than 4 years	1,20	1,19	1,22	< 0,01
<b>Age Group (Ref: 30-59 years)</b>				
0 - 5 years-old	1,39	1,34	1,44	< 0,01
6 -14 years-old	1,34	1,32	1,36	< 0,01
<b>Notification Period (Ref: 2004)</b>				
2012	1,48	1,42	1,54	< 0,01
2013	1,42	1,35	1,49	< 0,01
<b>State (Ref: Pará)</b>				
Acre	1,56	1,55	1,57	< 0,01
Rondônia	1,50	1,49	1,51	< 0,01
Roraima	1,26	1,25	1,27	< 0,01

\*Adjusted for all factors in the table and for sex, place of work, type of malaria, race and symptoms severity



# Discussion

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- Active surveillance seems to be an important tool to quickly identify people with malaria and quickly start the treatment.
- “It is known that the most marginalized people have the highest risks associated with malaria. They also have the least access to effective services for prevention, diagnosis and treatment”. (World Malaria Report 2014, WHO)
- As expected, we did find a trend throughout the notification period.



# Conclusion

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- Early treatment for malaria appears to be associated with active surveillance, early ages, geographical areas and access to public health care facilities.
- In recent years, cases were more likely to start treatment within 24 hours of symptoms onset.
- Inform policy makers and help to enforce the guideline treatment for malaria in Brazil.





# References

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- Ministry of Health, Department of Information of SUS (DATASUS). TabNet. Available at: <http://www.datasus.saude.gov.br/informacoes-de-saude/tabnet>
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# Thank you for listening!

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