Federica Giardina
f.giardina@erasmusmc.nl

Infectious disease modeler and biostatistician using mathematical and statistical models to study the evolution and transmission dynamics of infectious diseases with the aim of informing the design of more effective control interventions.

Education	**Ph.D., Epidemiology and Biostatistics** (Summa cum Laude), December 2013

University of Basel and Swiss and Tropical Public Health Institute, Basel, Switzerland
Dissertation topic: "Bayesian spatial models applied to malaria epidemiology"

M.Sc., Mathematical Engineering, July 2008
Polytechnic University of Milan, Milan, Italy
Dissertation topic: "Bayesian first order autoregressive latent variable models for multiple binary sequences"

B.Eng., Mathematical Engineering, March 2005
Polytechnic University of Milan, Milan, Italy

Work experience

Epidemiologist/Modeller   **October 2017 – present**
Erasmus MC, University Medical Center Rotterdam, Rotterdam, Netherlands
Research: Mathematical modelling of malaria, HIV and neglected tropical diseases with a focus on diagnostics. *Teaching*: Lecturing in Biostatistics and developing course material
Consultancy: Statistical methods, geospatial analyses using R and ArcGIS

Post-Doctoral fellow   **October 2014 – September 2017**
Stockholm University, Stockholm, Sweden and Karolinska University Hospital, Stockholm, Sweden and Los Alamos National Laboratory, Los Alamos, NM, US, Theoretical Biology division.
Research: Statistical and mathematical modelling of *i)* Estimating HIV time of infection with multiple biomarkers. *ii)* Improved national incidence estimation and derivation of HIV-infected people unaware of their infection status *iii)* Integration of phylogenetic data to better understand transmission networks in the HIV epidemic. *Teaching*: Lecturing in Biostatistics and Epidemiology with particular focus on Bayesian inference. Developing course material.

Scientific Collaborator   **November 2013 – October 2014**
Swiss Tropical and Public Health Institute, Basel, Switzerland and University of Basel, Basel, Switzerland.
Research: Statistical methodologies for the analysis of spatio-temporal epidemiological survey and surveillance data, mapping and statistical modelling for malaria in sub-Saharan Africa. Time series analysis and forecasting. *Consultancy*: Epidemiological study design, assistance in statistical implementation and evaluation, spatial visualization, and GIS for epidemiological studies within the institute and its collaborative programmes. *Teaching and Supervision*: i) MSc and PhD students assistance in statistics and ArcGIS ii) Developing course material for courses in epidemiology and biostatistics, tutorials in Remote sensing and ArcGIS.

Biostatistician   **September 2008 – October 2009**
Fundació SIDA i Societat (CEEISCAT), Barcelona, Spain
Statistical modelling, analyses and data management for projects focused on HIV/AIDS and STIs epidemiology and control among high risk groups in Guatemala.

Research assistant   **July 2007 - December 2007**
Pontifical Catholic University of Chile, Santiago de Chile, Chile
Research on Bayesian statistical models for longitudinal data on bladder cancer reoccurrence

Funding and Awards	"SchiSTOP: Beyond mass drug administration: understanding Schistosomiasis dynamics to STOP transmission". **Marie Sklodowska-Curie Individual Fellowship**, Horizon2020 EU	175,000 €	**2019**
	"Technical feasibility of sensitive POC-CAA RDT in whole blood and urine to support elimination of Schistosomiasis**". Bill&Melinda Gates Foundation** with Foundation for Innovative New Diagnostics.	40,000 €	**2018**
	"Towards elimination of schistosomiasis: mathematical models and statistical methods to explore novel control interventions" **LEaDing Fellows Postdocs Programme**	95,000 €	**2018**
	Travel award to attend the workshop on Statistical network science, Eindhoven (NL)	1,500 €	**2017**
	Travel award to attend the Summer school on infectious disease dynamics, University of Washington, Seattle (US)	2,300 €	**2016**
	Copernicus Masters Ideas Challenge Winner 2013 with the project "Eye on malaria: Africa-wide monitoring of environmental suitability for malaria transmission" with Dr. Jonas Franke	30,000 €	**2013**
	Travel award to present at Statistical Modelling for Biological and Environmental Systems, Venice (IT)	1,700 €	**2011**
	Master thesis award - funded by Politecnico di Milano (IT), 2007: Fellowship and travel award Universidad Ponticia Católica de Chile	5,000 €	**2007**
	Erasmus Student exchange program scholarship, Universidad Autónoma de Madrid (ES)	2,340 €	**2006**

Supervising and mentoring	*Erasmus MC*: PhD Veronica Malizia	**2019- present**
	Stockholm University: PhD Rebecca Nalule (remotely)	**2017- present**
	Swiss TPH: MSc Aphelele Mgabisa, MSc Noluthando Ndlovu, PhD Sabelo Dlamini (co-supervisor) and PhD Abbas Adigun (co-supervisor)	**2011-2014**

Reviewer	Statistics in Medicine, Spatial and Spatio-temporal epidemiology, Applied Mathematical Modelling, Nature, PLoS One, PLoS Neglected Tropical Diseases, Malaria Journal.

Other activities

- Communication officer for the **Rotterdam Global Health Initiative** (2020 – present)
- Evaluator of the Tuberculosis **Hackathon**: can we make useful predictive models for sub-national tuberculosis burden in Pakistan? Royal Tropical Institute (2019)
- **Post-Doc network board** member, Erasmus MC (2018 - present)
- Coordinator of the **seminar** in mathematical statistics, Stockholm University (2016-2017)
- Organizer of the bimonthly **journal club** on infectious disease modelling, Stockholm University (2014-2017)
- PhD students' representative, Swiss TPH (2012-2013)

Technical skills

- Statistics: R, (R-INLA, R Markdown, R Shiny), STATA, knowledge of Python
- Bayesian statistics packages: Stan, JAGS/BUGS.
- Applications: LATEX, ArcGIS, QGIS, Office and internet applications

Languages	Italian (mother tongue), English (fluent), Spanish (fluent), French (intermediate)

Teaching experience	**Introduction to Bayesian Biostatistics**	**Summer 2020**

Instructor with E. Lesaffre. Erasmus Summer Programme. NIHES *Erasmus MC, University Medical Center Rotterdam*, Rotterdam, Netherlands

Biostatistics   **Fall term 2018**
Course material developer, teaching assistant. Master programme NIHES *Erasmus MC, University Medical Center Rotterdam*, Rotterdam, Netherlands

Bayesian Methods for Data Analysis   **March 2018**
Main instructor. PhD programme in Mathematics and Mathematical Statistics *Makerere University*, Kampala, Uganda.

Geographic Information Systems in Health System Strengthening   **May 2017**
Main instructor. GIS training for the Association for Reproductive and Family Health and national TB control program (Global Fund TB project). *Lagos,* Nigeria for The Royal Tropical Institute – Amsterdam

Statistics for epidemic models   **Spring term 2017**
Main instructor. MSc in mathematical statistics
Stockholm University, Stockholm, Sweden

Categorical data analysis   **Spring term 2015 and 2016**
Teaching assistant. MSc in mathematical statistics
Stockholm University, Stockholm, Sweden

Statistics II   **November 2015**
Main instructor. MSc in Mathematics (Center International de Mathématiques Pures et Appliquées). *Royal University of Phnom Penh*, Phnom Penh, Cambodia

Bayesian biostatistics   **Fall term 2015**
Main instructor. MSc in mathematical statistics
Stockholm University, Stockholm, Sweden

Spatial statistics for malaria epidemiology   **January 2013**
Main instructor. Training for the national malaria control programs (Mozambique, South-Africa, Sudan) within the MALAREO project (Earth Observation in Malaria Vector Control and Management). *University of KwaZulu-Natal*, Durban, South Africa

ArcGIS tutorial   **June 2011**
Main instructor. MSc parasitology and National Malaria control program in Senegal
Cheick Anta Diop University, Dakar, Senegal

Biostatistics I   **Fall term 2009-2014**
Teaching assistant. MSc in Infection Biology/Epidemiology
University of Basel, Basel, Switzerland

Biostatistics II   **Spring term 2009-2014**
Teaching assistant. MSc in Infection Biology/Epidemiology
University of Basel, Basel, Switzerland

Fundamentals of statistics   **January 2010-2014**
Main instructor. Health Care and Management in Tropical Countries programme
University of Basel, Basel, Switzerland

Peer-reviewed manuscripts

1. Toor J. et al. (2021). Strengthening data collection for neglected tropical diseases: What data are needed for models to better inform tailored intervention programmes? Accepted in PLOS NTDs.
2. Vegvari C., **Giardina F.** et al. (2021). Impact of key assumptions about the population biology of soil-transmitted helminths on the sustainable control of morbidity. Accepted in Clinical Infectious Diseases.
3. Vegvari, C., **Giardina, F.**, et al. (2021) Deworming Women of Reproductive Age During Adolescence and Pregnancy: What is the Impact on Morbidity From Soil-transmitted Helminths Infection? Accepted in Parasites & Vectors.

4. Malizia V, **Giardina F**, Vegvari C et al. (2020) Modelling the impact of COVID-19-related control programme interruptions on progress towards the WHO 2030 target for soil-transmitted helminths. Transaction of the Royal Tropical Society 2020; 0: 1–8

5. Toor J, et al. (2020). Predicted Impact of COVID-19 on Neglected Tropical Disease Programs and the Opportunity for Innovation. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America.*

6. Bulstra C, Hontelez J, **Giardina F**, Steen R, Nagelkerke N, Bärnighausen T, de Vlas SJ. (2020) Mapping and characterising areas with high levels of HIV transmission in sub-Saharan Africa: A geospatial analysis of national survey data. PLoS Medicine 17 (3), e1003042

7. NTD Modelling Consortium discussion group on soil-transmitted helminths (2019) Insights from quantitative analysis and mathematical modelling on the proposed WHO 2030 goals for soil-transmitted helminths. Gates Open Res, 3:1632

8. **Giardina F.**, Coffeng L.E., Farrell S.H., Vegvari C., Werkman M., Truscott J., Anderson R.M., de Vlas S.J. (2019) Model-predicted impact of sampling strategies on soil-transmitted helminths morbidity outcomes. PLoS Neglected Tropical Diseases, 13(6), e0007514.

9. **Giardina, F.**, Romero-Severson, E.O., Axelsson, M., Svedhem, M., Leitner, T., Britton, T., Albert, J. (2019) Getting more from heterogeneous HIV-1 surveillance data in a high immigration country: estimation of incidence and undiagnosed population size using multiple biomarkers. International Journal of Epidemiology, 48 (6), 1795-1803

10. Michael, E., Sharma S., Smith M.E., Touloupou P., **Giardina, F.**, Prada J.M., Stolk W.A., Hollingsworth D., de Vlas, S.J. (2018) Quantifying the value of surveillance data for improving model predictions of lymphatic lariasis elimination. PLoS Neglected Tropical Diseases 12 (10), e0006674

11. **Giardina, F.**, Romero-Severson, E.O., Albert, J., Britton T., Leitner, T. (2017) Inference of transmission network structure from HIV phylogenetic trees. PLOS Computational Biology 13(1): e1005316.

12. Britton, T, **Giardina, F.** (2016) Introduction to statistical inference for infectious diseases. Journal de la Société Française de Statistique, 157(1) 53-70.

13. Schär, F., **Giardina, F.**, Khieu, V., Muth, S., Vounatsou, P., Marti, H., Odermatt, P. (2016) Occurrence of and risk factors for Strongyloides stercoralis infection in South-East Asia. Acta Tropica 159, 227-238.

14. **Giardina, F.**, Franke, J., Vounatsou, P. (2015) Geostatistical modeling of malaria risk in Mozambique: assessing the effect of spatial resolution of remote sensing-derived environmental variables. Geospatial Health 10 (2).

15. Coscolla, M., Copin, R., Sutherland, J., Gehre, F., de Jong, B., Owolabi, O., Mbayo, G., **Giardina, F.**, De Ernst, J. and Gagneux, S. (2015) M. tuberculosis T Cell Epitope Analysis Reveals Paucity of Antigenic Variation and Identies Rare Variable TB Antigens. Cell host & microbe 18 (5): 538-548.

16. **Giardina, F.**, Kasasa, S., Sié, A., Utzinger, J., Tanner, M., Vounatsou, P. (2014) Effects of vector control interventions on changes in risk of malaria parasitaemia in sub-Saharan Africa: a spatial and temporal analysis. The Lancet Global Health 2.10: e601-e615.

17. Borrell, S., Teo, Y., **Giardina, F.**, Streicher, E. M., Klopper, M., Feldmann, J., Müller, B., Victor, T.C., Gagneux, S. (2013) Epistasis between antibiotic resistance mutations drives the evolution of extensively drug-resistant tuberculosis. Evolution, Medicine and Public Health, eot003v1-eot003.

18. Schär, F., Trostdorf, U., **Giardina, F.**, Khieu, V., Muth, S., Marti, H., Vounatsou, P., Odermatt, P. (2013) Strongyloides stercoralis: Global distribution and risk factors. PLoS Negl Trop Dis 7, e2288.

19. **Giardina, F.**, Gosoniu, L., Konate, L., Diouf, M.B., Perry, R., Gaye, O., Faye, O., Vounatsou, P. (2012) Estimating the burden of malaria in Senegal: Bayesian Zero Infated Binomial geostatistical modeling of the MIS 2008 data. PLoS One 7, e32625.

20. **Giardina, F.**, Guglielmi, A., Quintana, F.A., Ruggeri, F. (2011) Bayesian first order autoregressive latent variable models for multiple binary sequences. Statistical Modeling 11: 471-488.

21. Sabidó, M., Lahuerta, M., Montoliu, A., Gonzalez, V., Hernandez, G., **Giardina, F.**, Monzón, J. E., Casabona, J., Pedroza, M.I. (2011) HIV, Sexually Transmitted Infections and Risk Behaviours among clients of sex workers in Guatemala: are they a bridge in HIV transmission? Sex Transm Dis 38: 735-42.

22. Lahuerta, M., Sabidó, M., **Giardina, F.**, Hernandez, G., Palacios, J.F., Ortiz, R., Fernandez, V.H., Casabona J. (2010) Comparison of users of an HIV/syphilis screening community-based mobile van and traditional voluntary counselling and testing sites in Guatemala. Sex Trans Infect 87:136-40.

23. Sabidó, M., **Giardina, F.**, Hernandez, G., Fernandez, V. H., Monzón, J.E., Ortiz, R., Montoliu, A., Casabona, J. (2009) The UALE Project: decline in the incidence of HIV and sexually transmitted infections and increase in the use of condoms among sex workers in Guatemala. JAIDS, 51.

Book chapters

1. **Giardina, F.**, Sogoba, N., Vounatsou, P. (2015) Bayesian variable selection in semi-parametric and non-stationary geostatistical models: an application to mapping malaria risk in Mali. Book chapter in the upcoming Lawson, A., Banerjee, S., Haining R. and Ugarte L. (eds.) Handbook of Spatial Epidemiology. CRC Press.

2. Franke, J., Bauwens, I., Deleu, J., de Montpellier, C., Dlamini, S., Gebreslasie, M., **Giardina, F.**, Siegert, F., and Vounatsou, P. (2013). MALAREO MapAtlas - Exploring the spatial dimension of malaria and its explaining environmental factors in Southern Africa by Earth Observation.

Submitted manuscripts & Preprints

1. **Giardina, F**., and Britton, T. Statistical inference in under-reported epidemics. *(under review)*.

2. Borlase, A., et al. Evaluating the Potential Indirect Impact of COVID-19: A Modelling Study of Programme Interruptions for Seven Neglected Tropical Diseases. *(under review)*

3. Alba S. et al. TB Hackathon: Cross-validation of five models to predict subnational tuberculosis prevalence in Pakistan *(in prep)*.

4. Starck T., Bulstra C., Taylor C., **Giardina F**. Modeling malaria survey data using different diagnostics: is the spatial structure preserved? *(in prep)*

5. **Giardina F.**, Van Rosmalen J., Coffeng L. ABC-SMC calibration of microsimulation models *(in prep)*.

Invited Talks

1. Approaching schistosomiasis elimination: from mass treatment to targeted interventions. **COR-NTD** breakout session (pre-meeting). September 2020.

2. Approximate Bayesian Computation with application to microparasite transmission models. **Neglected Tropical Diseases Technical meeting.** Oxford (UK), March 2020.

3. Spatial epidemiology in R. R-ladies, Rotterdam (NL), May 2019

4. **Epi-recipes workshop: developing a cookbook of epidemiological models**. The Alan Turing Institute, London (UK), 1-3 October 2018

5. Statistical inference for infectious diseases using phylogenies: epidemiological parameters and contact networks. **Research seminar at the Department of Mathematics**. Makerere University, Kampala (Uganda), 22 March 2018.

6. Statistical methods to estimate the size of the undiagnosed HIV-1 infected population. **Workshop on infectious disease modelling**, Stockholm University, Stockholm (SE) February 2018.

7. Model-predicted impact of sampling strategies on soil-transmitted helminths morbidity outcomes. **Erasmus MC worm club**, Rotterdam, (NL), 15 June 2018.

8. Statistical methods to fit individual-based models for parasitic infections. **Erasmus MC worm club**, Rotterdam, (NL), 4 December 2017.

9. Statistical methods to estimate the size of the undiagnosed HIV-1 infected population. **Meeting of the Catalan, Spanish, Swedish Math Societies (Mathematical Biology)**, Umea, (SE), 12-15 June 2017.

10. Inferring contact network structure from HIV phylogenies. **SIMID meeting-infectious disease modelling**, Antwerp, (BE), 16-18 May 2017.

11. **NTDs modelling consortium meeting - focus on onchocerciasis**, Erasmus MC Rotterdam (NL), May 2017.

12. Statistical methods to estimate the size of the undiagnosed HIV-1 infected population. **Seminarium i matematisk statistik**, Stockholm University, Stockholm (SE), April 2017.

13. Inferring contact network structure from HIV phylogenies. **Workshop on Microbial Source Attribution using genomic data**, Imperial College, London, (UK), May 2016.

14. Statistics applications to biology and epidemiology **Royal University of Phnom Penh**, Phnom Penh, (Cambodia), November 2015.

15. HIV epidemic in Sweden: can we infer the structure of sexual contact networks from pathogen phylogenies? **17th Stockholm-Uppsala Symposium on Mathematical statistics**, Stockholm University, Stockholm, (SE), May 2015.

16. Geostatistical models for malaria burden estimation. **Seminarium i matematisk statistik**, Stockholm University, Stockholm, (SE), January 2015.

17. Mapping in health research. **Royal Tropical Institute**, Amsterdam (NL), December 2013.

Conference and Workshop Presentations

1. Stochastic model calibration: optimising approximate Bayesian computation using sequential Monte Carlo. **Technical meeting of the Neglected Tropical Diseases modelling consortium**, Oxford (UK), March 2020.

2. **Technical meeting of the Neglected Tropical Diseases modelling consortium**, Oxford (UK), March 2019.

3. Model-predicted impact of sampling strategies on soil-transmitted helminths morbidity outcomes. Annual meeting of the **American Society of Tropical Medicine and Hygiene**, New Orleans (LA), October 2018.

4. Undiagnosed HIV-1 cases in Sweden close to 10% UNAIDS target based on multiple biomarker estimation of infection times **11th Netherlands Conference on HIV**, Amsterdam (NL), November 2017.

5. **SEMSTAT Workshop Statistical network science**, Eindhoven (NL), March 2017. Inferring the structure of sexual contact networks from pathogen phylogenies. **HIV dynamics and evolution**, Woods Hole (MA), April 2016.

6. HIV epidemic in Sweden: can we infer the structure of sexual contact networks from pathogen phylogenies? **7th Swedish meeting on mathematical biology**, Uppsala (SE), December 2015.

7. HIV epidemic in Sweden: can we infer the structure of sexual contact networks from pathogen phylogenies? **Mathematical and Computational Epidemiology of Infectious diseases - the interplay between models and public health policies**, Erice (IT), September 2015.

8. Bayesian meta-analysis of heterogeneous geo-references disease survey data via transmission models. **International Biometrical Society Conference**, Florence (IT), July 2014.

9. Assessing the impact of interventions on malaria parasitaemia in Africa: A spatio-temporal analysis of Malaria Indicator Survey Data. **6th Pan-African malaria conference (MIM)**, Durban (SA), October 2013.

10. Bayesian variable selection in semi-parametric and non-stationary geostatistical models: an application to mapping malaria risk in Mali. **Spatial Statistics 2013. Revealing intricacies in spatial and spatio-temporal data with statistics,** Columbus (OH) June 2013.

11. Bayesian geostatistical model specification of zero-inated Binomial data: an application to malaria epidemiology (poster). **Bayesian methods in biostatistics and bioinformatics**, Barcelona (ES), December 2012.

12. Mapping malaria risk in Mali with non stationary geostatistical models. Demographic and Health Survey 2010. **Challenges in Malaria Research. Progress towards elimination**, Basel (CH), October 2012.

13. A Bayesian geostatistical formulation of seasonal malaria transmission models. **Statistical Modelling for Biological and Environmental Systems**, Venice (IT), September 2011.

14. Bayesian meta-analysis of heterogeneous malaria survey data via transmission models. **Swiss Meeting for Infectious Disease Dynamics**, Basel (CH), August 2011.