# Fernando Saldaña

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🌐 My personal webpage

## Profile

I'm an applied mathematician with a passion for research and teaching. In terms of research, I am interested in using mathematical modeling and simulation methods to problems in epidemiology, ecology, and public health. I have excellent Python programming skills. I'm also trained in statistics and I have knowledge of machine learning algorithms e.g. supervised learning. I have experience in teaching (both online and presential) at the University level in topics such as ordinary differential equations, linear algebra, calculus, probability, and numerical analysis.

## Current position

MARCH 2021 – TO PRESENT
**Postdoctoral position / Basque Center for Applied Mathematics - BCAM, Spain**

## Experience

AUGUST 2020 – TO DECEMBER 2021
**Postdoctoral position / UNAM, Mexico**

**Teaching:** Undergraduate courses in linear algebra, probability, ordinary differential equations, numerical analysis, and calculus at University of Guadalajara, and Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM). Graduate course Mathematical models for epidemiology at BCAM.
**Languages:** Spanish (mother tongue). C1 level English (I have written the original draft for all the papers in which I'm the first author and I also given several talks in English).

## Education

**PhD Applied Mathematics/**Centro de Investigación en Matemáticas (CIMAT), Mexico (2016-2020), Advisor: I. Barradas

**MSc Applied Mathematics/**Centro de Investigación en Matemáticas (CIMAT), Mexico (2014-2016), Advisor: I. Barradas

**BSc Mathematics/** Universidad de Guadalajara, Mexico (2010-2014)

## Academic honors and awards

- Member of "Sistema Nacional de Investigadores (SNI) Mexico", level I. Since 2021.
- PhD and BSc with honors.

- Citations 170, H-index 5, i10-index 5 (Google scholar).
- Visiting position (6 Months) at CRM-Centre de Reserca Matematica, Spain, 2018-2019
- Best contributed talk at 13th Conference on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS)
- 12 research articles as first and corresponding author.

## Service

- Organizer of the 14 Conference on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS), 2023.
- Reviewer for the following journals: PLOS ONE, BMC Infectious Diseases, Journal of Mathematical Biology, Royal Society Open Science, Chaos Solitons and Fractals, Mathematical Biosciences, Journal of Mathematical Analysis and Applications.
- Member of the evaluation committee of the Poster sessions of the 14th Conference on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS).

## Peer-reviewed publications

**Saldaña, F.,** Kebir, A., Camacho-Gutíerrez, J. A., & Aguiar, M. (2023). Optimal vaccination strategies for a heterogenous population using multiple objectives: The case of L1– and L2– formulations. *Mathematical Biosciences,* 366, 109103. *https://doi.org/10.1016/j.mbs.2023.109103*

**Saldaña, F.,** María L. Daza-Torres, & Aguiar, M. (2023). Data-driven estimation of the instantaneous reproduction number and growth rates for the 2022 monkeypox outbreak in Europe. *Plos One*. https://doi.org/10.1371/journal.pone.0290387

**Saldaña, F.,** Steindorf, V., Srivastav, A. K., Stollenwerk, N., & Aguiar, M. (2023). Optimal vaccine allocation for the control of sexually transmitted infections. *Journal of Mathematical Biology*, *86*(5), 75. https://doi.org/10.1007/s00285-023-01910-y

**Saldaña, F.,** Camacho-Gutiérrez, J. A., Villavicencio-Pulido, G., & Velasco-Hernández, J. (2022). Modeling the transmission dynamics and vaccination strategies for human papillomavirus infection: An optimal control approach. *Applied Mathematical Modelling*. https://doi.org/10.1016/j.apm.2022.08.017

**Saldana, F.,** & Velasco-Hernandez, J. X. (2021). Modeling the COVID-19 pandemic: A primer and overview of mathematical epidemiology. *SeMA Journal: Bulletin of the Spanish Society of Applied Mathematics*. *https://doi.org/10.1007/s40324-021-00260-3*

**Saldana, F.,** Camacho-Gutierrez J.A., Barradas I., Korobeinikov, A. (2021). When optimal is not the best: Cost-effectiveness analysis for HPV epidemic models. *Revista de modelamiento matemático de sistemas biológicos.* *https://revistammsb.utem.cl/?p=223*

**Saldana, F.,** & Velasco-Hernandez, J. X. (2021). The trade-off between mobility and vaccination for COVID-19 control: a metapopulation modeling approach. *Royal Society Open Science*. https://doi.org/10.1098/rsos.202240

**Saldaña F.,** Flores-Arguedas H., Camacho-Gutierrez J.A., Barradas I. (2020) Modeling the transmission dynamics and the impact of the control interventions for the COVID-19 epidemic outbreak. *Mathematical Biosciences and Engineering*. 10.3934/mbe.2020231.

**Saldaña F.**, Barradas I. (2020) Evaluating the potential of vaccine-induced type replacement for high-risk human papillomaviruses. *Mathematical Methods in the Applied Sciences.* **https://doi.org/10.1002/mma.5932**

Camacho, A., **Saldaña, F**., Barradas, I. Jerez, S. (2019) Modeling Public Health Campaigns for Sexually Transmitted Infections via Optimal and Feedback Control. *Bulletin of Mathematical Biology.* https://doi.org/10.1007/s11538-019-00642-9

**Saldaña, F.**, Korobeinikov, A. & Barradas, I. (2019) Optimal Control against the Human Papillomavirus: Protection versus Eradication of the Infection. *Abstract and Applied Analysis.* https://doi.org/10.1155/2019/4567825

**Saldaña, F**., & Barradas, I. (2018). The role of behavioral changes and prompt treatment in the control of STIs. *Infectious Disease Modelling.* https://doi.org/10.1016/j.idm.2018.12.001

**Saldaña, F**., & Barradas, I. (2018). Control Strategies in Multigroup Models: The Case of the Star Network Topology. *Bulletin of mathematical biology*, *80*(11), 2978-3001. https://doi.org/10.1007/s11538-018-0503-6

Solis, F. J., & **Saldaña, F**. (2018). Biological mechanisms of coexistence for a family of age structured population models. *Journal of Computational and Applied Mathematics*, *343*, 708-718. https://doi.org/10.1016/j.cam.2018.04.065

## Book chapters

Flores-Arguedas, H., Camacho-Gutiérrez, J.A., **Saldaña, F**. (2023). Retrospective Modeling of the Impact of Vaccination and Non-pharmaceutical Interventions on the COVID-19 Pandemic. In: *Sriraman, B. (eds) Handbook of Visual, Experimental and Computational Mathematics.* Springer, Cham. https://doi.org/10.1007/978-3-030-93954-0_43-1

Gerrish, P. J., **Saldaña, F.**, Colato, A., Torres, E. E. R., Okosun, T. Y., & Velasco-Hernández, J. X. (2023). Pandemic response: Isolationism or solidarity?: An evolutionary perspective. In *Mathematical Modelling, Simulations, and AI for Emergent Pandemic Diseases* (pp. 93-108). Academic Press. https://doi.org/10.1016/B978-0-323-95064-0.00007-5

## Selected conferences

"Modeling spillover dynamics: understanding pathogens of public health concern", 14th Conference on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS), February 2023, Bilbao, Spain.

"Vaccine allocation for sexually transmitted infections via an optimal control problem with an isoperimetric constraint", 6 Workshop de Modelamiento Matemático de Sistemas Biológicos, Universidad Tecnológica Metropolitana, Santiago, Chile, January 2022.

"Want to prevent epidemics? Stop spillover events", Meeting of the Real Sociedad de Matemática Española y la Unión Matemática Argentina, December 2022, Ronda, Spain.

"An stochastic SHAR model to investigate emerging infectious diseases", XII Congreso Latinoamericano de Matemáticas, Universidad de Sao Paulo, Sao Paulo, Brazil, November 2022.

"Optimal vaccine allocation for the control of sexually transmitted infections", International Conference on Mathematical Analysis and Applications in Science and Engineering, June 2022, Porto, Portugal.

"How unequal vaccine distribution promotes the evolution of vaccine escape: insights from a simple model", 13th Conference on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS), February 2022, Bilbao, Spain.

"A model for vaccine escape under unequal vaccine access: The case of COVID-19", Annual meeting of the Society for Mathematical Biology (SMB), University of California, California, USA, June 2021.

"COVID-19 en México: Datos y Modelos", XI Congreso Latinoamericano de Matemáticas, Universidad Católica del Maule, Talca, Chile, January 2021.

"Fortalezas y limitaciones de los modelos tipo Kermack-McKendrick para entender la pandemia de COVID-19", Primer foro internacional de matemáticas aplicadas, Universidad Autonoma de Guerrero, Mexico, November 2020.

"Control óptimo en modelos epidemiológicos complejos", Simposio de Matemática Pura y Aplicada, Universidad Catolica de San Pablo, Arequipa, Perú, December, 2019.

"Control Strategies in a Star Network Setting", XIII Encuentro nacional de biología matemática, Universidad de Colima, Colima, Mexico, October 9-13, 2017.

"The target reproduction number for models with host heterogeneities", X Congreso Latinoamericano de Biomatemáticas, Universidad Nacional San Antonio del Abad del Cusco, Cusco, Peru, September 7-11, 2017.