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RESEARCH INTERESTS

Ecological drivers of pathogens in animal populations
Human animal interfaces and spillover and One Health

KNOWLEDGE

Scientific	Veterinary epidemiology, disease surveillance, wildlife health
Epidemiological	Research design, diagnostic test validation, research in low-income countries
Analytical	Mathematical modeling of infectious diseases, advanced machine learning models in disease ecology and veterinary epidemiology, cloud computing
Diversity and leadership	Sustainable solutions to underprivileged communities through scientific solutions, leading student and postdoc groups, student outreach

CURRENT POSITION

Current
March 2021
Assistant Researcher, ONE HEALTH INSTITUTE,
School of Veterinary Medicine, University of California Davis

Current
September 2021
Lecturer, DEPARTMENT OF MEDICINE AND EPIDEMIOLOGY,
School of Veterinary Medicine, University of California Davis
- Co-instructor on record for Principles of Epidemiology (EPI 205/MPM 205)

EDUCATION AND TRAINING

2016-2021 **Postdoctoral Researcher**, EpiCenter for Disease Dynamics, One Health Institute, School of Veterinary Medicine, University of California Davis.

2012-2015 **Ph.D. Epidemiology**, École Nationale Vétérinaire, Agroalimentaire et de l'Alimentation, Nantes,ONIRIS/ French National Institute of Agricultural Research (INRA) **Thesis :** Regional spread and control of Q fever in dairy cattle herds : a multiscale modeling approach.

2011-2012 **Master of Preventive Veterinary Medicine**, School of Veterinary Medicine, University of California Davis **Thesis :** Modeling highly pathogenic avian influenza transmission in wild birds and poultry in West Bengal, India.

2005-2010 **Bachelor of Veterinary Science and Animal Husbandry**, Maharashtra Animal and Fishery Science University, India.

AWARDS AND ACHIEVEMENTS

2020-2021 **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES):**, Invited expert for workshop on modelling Nature Futures scenarios.Selected as one of 30 experts around the world by IPBES to develop models and scenarios relevant to biodiversity and ecosystem services.

2015 **Scotland's Rural College Award (SRUC Price, SVEPM 2015, Ghent Belgium**, Best oral presentation award for early career scientists, awarded in the annual conference of Society of Veterinary Epidemiology and Preventive Medicine 2015.

2011 **Narotam Sekhsaria Fellowship**, Competitive higher education scholarship awarded by Narotam Sekhsaria Foundation, India for the education in University of California Davis.

2010 **Ravi Shankaran Fellowship by Inlaks Foundation, India** Scholarship awarded for the externship in Abu Dhabi Falcon Hospital.

2007-2010 **Kishor Vaigyanik Protsahan Yojana (KVPY) Fellow** A prestigious national fellowship program by the Department of Science and Technology Govt. of India for the development of young promising scientists.

Publications

Journal Articles

Google Scholar profile here.

1. Singh, J., Pandit, P., McArthur, A. G., Banerjee, A., and Mossman, K. Evolutionary trajectory of sars-cov-2 and emerging variants. *Virology journal 18*, 1 (2021), 1–21
2. Pandit, P. S., Williams, D. R., Rossitto, P., Adaska, J. M., Pereira, R., Lehenbauer, T. W., Byrne, B. A., Li, X., Atwill, E. R., and Aly, S. S. Dairy management practices associated with multi-drug resistant fecal commensals and salmonella in cull cows : a machine learning approach. *PeerJ 9* (2021), e11732
3. Kelly, T. R., Pandit, P. S., Carion, N., Dombrowski, D. F., Rogers, K. H., McMillin, S. C., Clifford, D. L., Riberi, A., Ziccardi, M. H., Donnelly-Greenan, E. L., et al. Early detection of wildlife morbidity and mortality through an event-based surveillance system. *Proceedings of the Royal Society B 288*, 1954 (2021), 20210974
4. Pandit, P. S., Bandivadekar, R. R., Johnson, C. K., Mikoni, N., Mah, M., Purdin, G., Ibarra, E., Tom, D., Daugherty, A., Lipman, M. W., et al. Retrospective study on admission trends of californian hummingbirds found in urban habitats (1991–2016). *PeerJ 9* (2021), e11131
5. Wolking, D., Karmacharya, D., Bista, M., Shrestha, R., Pandit, P., Sharma, A., Manandhar, S., Shrestha, B., Bajracharya, S., Bhatta, T., et al. Vulnerabilities for exposure to emerging infectious disease at urban settlements in nepal. *EcoHealth 17*, 3 (2020), 345–358
6. Baek, H. E., Bandivadekar, R. R., Pandit, P., Mah, M., Sehgal, R. N., and Tell, L. A. Taqman quantitative real-time pcr for detecting avipoxvirus dna in various sample types from hummingbirds. *PloS one 15*, 6 (2020), e0230701
7. Johnson, C. K., Hitchens, P. L., Pandit, P. S., Rushmore, J., Evans, T. S., Young, C. C., and Doyle, M. M. Global shifts in mammalian population trends reveal key predictors of virus spillover risk. *Proceedings of the Royal Society B 287*, 1924 (2020), 20192736
8. Young, S. L., Pandit, P., and Han, B. A. Rise of machines in disease ecology. *Bulletin of the Ecological Society of America 101*, 1 (2020), 1–4
9. Pandit, P. S., Doyle, M. M., Smart, K. M., Young, C. C., Drape, G. W., and Johnson, C. K. Predicting wildlife reservoirs and global vulnerability to zoonotic flaviviruses. *Nature communications 9*, 1 (2018), 1–10
10. Bandivadekar, R. R., Pandit, P. S., Sollmann, R., Thomas, M. J., Logan, S. M., Brown, J. C., Klimley, A. P., and Tell, L. A. Use of rfid technology to characterize feeder visitations and contact network of hummingbirds in urban habitats. *PloS one 13*, 12 (2018), e0208057
11. Pandit, P., Hoch, T., Ezanno, P., Beaudeau, F., and Vergu, E. Spread of coxiella burnetii between dairy cattle herds in an enzootic region : modelling contributions of airborne transmission and trade. *Veterinary Research 47*, 1 (2016), 48
12. Ezanno, P., Beaunée, G., Qi, L., Arnoux, S., and Vergu, E. Spread and control of enzootic cattle diseases : a data-driven multiscale modelling framework to prioritize complex regional strategies. In *10. European Conference on Mathematical and Theoretical Biology (ECMTB)* (2016)
13. Pandit, P. S., Bunn, D. A., Pande, S. A., and Aly, S. S. Modeling highly pathogenic avian influenza transmission in wild birds and poultry in west bengal, india. *Scientific reports 3*, 1 (2013), 1–8
14. Pande, S., Padhye, A., Deshpande, P., Ponkshe, A., Pandit, P., Pawashe, A., Pednekar, S., Pandit, R., and Deshpande, P. Avian collision threat assessment at 'bhambarwadi wind farm plateau' in northern western ghats, india. *Journal of Threatened Taxa 5*, 1 (2013), 3504–3515
15. Bandivadekar, R., Pandit, R., Ponkshe, A., and Pandit, P. Veer dam as important winter migratory ground for bar-headed geese anser indicus (latham, 1790) family : Anatidae, with special reference to observations of tagged bar-headed geese. *ZOO's PRINT 27*, 1 (2012)
16. Pandit, P., Bandivdekar, R., Geevarghese, G., Pande, S., and Mandke, O. Tick infestation on wild snakes in northern part of western ghats of india. *Journal of medical entomology 48*, 3 (2011), 504–507
17. Pande, S., Pandit, P., Ponkshe, A., Mone, R., Pawar, S., and Mishra, A. Behavioural and virological studies on a rescued oriental white-backed vulture gyps bengalensis from western maharashtra, india. *Journal of Threatened Taxa 3*, 1 (2011), 1490–1492
18. Pandit, P., Page, J., Kahsnis, M., and Ponkshe, A. Spirurid infestation in green keelback (macropisthodon plumbicolor) : a case study. *Newsletter of the South Asian Reptile Network* (2010), 19
19. Pawar, S., Pande, S., Jamgaonkar, A., Koratkar, S., Pal, B., Raut, S., Nanaware, M., Ray, K., Chakrabarti, A., Kode, S., et al. Avian influenza surveillance in wild migratory, resident, domestic birds and in poultry in maharashtra and manipur, india, during avian migratory season 2006–07. *Current Science* (2009), 550–554

Articles under communication

1. P. S. Pandit, S.J. Anthony, T. Goldstein, K. J. Olival, M. M. Doyle, N. R. Gardner, B. Bird, W. Smith, D. Wolking, K. Gilardi, C. Monagin, T. Kelly, M. Uhart, J. H. Epstein, C. Machalaba, M. K. Rostal, P. Dawson, E. Hagan, A. Sullivan, H. Li, A. A. Chmura, A. Latinne, C. Lange, T. O'Rourke, S. Olson, L. Keatts, P. Mendoza, A. Perez, C. Dejuste de Paula, D. Zimmerman, M. Valitutto, M. LeBreton, D. McIver, A. Islam, V. Duong, M. Mouiche, Z. Shi, P. Mulembakani, M. Ali, N. Kebede, U. Tamoufe, S. Bel-Nono, A. Camara, J. Pamungkas, K. Coulibaly, E. Abu-Basha, J. Kamau, S. Silithammavong, J. Desmond, T. Hughes, E. Shiilegdamba, O. Aung, D. Karmacharya, J. Nziza, D. Ndiaye, A. Gbakima, Z. Sijali, S. Wacharapluesadee, E. Alandia Robles,B. Ssebide, G. Suzán, L. F. Aguirre, M. R. Solorio, T. N. Dhole, P. L. Hitchens, D. O. Joly, K. Saylors, A. Fine, S. Murray, W. Karesh, P. Daszak, J. A. K. Mazet, PREDICT Consortium, C. K. Johnson. Predicting the potential for zoonotic transmission and host associations for novel viruses. [Under review]
2. J. N. Sanchez, B. A. Munk, J. Colby, S. G. Torres, B. J. Gonzales, J. R. DeForge, A. J. Byard, L. Kondeb, N. Shirkey, P. S. Pandit, R. A. Bottac, A. Rouge, M. H. Ziccardi, C. K. Johnson. Epidemiology of infectious pathogens in endangered Peninsular bighorn sheep (Ovis canadensis nelsoni)[Under review]

Thesis and book chapters

1. Pandit, P. *Regional spread and control of Q fever in dairy cattle herds*. PhD thesis, ONIRIS- École nationale vétérinaire, agroalimentaire et de l'alimentation …, 2015
2. MAHABAL, A., PANDE, S., PANDIT, P., and PONKSHE, A. Zool. surv. india fauna of maharashtra, state fauna series, 20 (part 1) : 147-188, 2011

Editorial contributions : visit my Publons profile here.
Peer-reviewed for : Nature Communications, Proceedings of Royal Society B, Ecological Modeling, Zoonosis and Public Health, Animal Behavior, Preventive Veterinary Medicine, PeerJ, Social Science and Medicine, PLOS Neglected Tropical Diseases

Talks

1. Pandit, P., Invited panelist for : Mini-Symposium on Digitization and Innovation in Animal Health. Center for Analytics and Technology in Society,University of Maastricht and University of California Davis. 9 November 2021, UC Davis, CA, USA.
2. Pandit, P., Doyle, M., Young, C., Johnson, C. Machine learning for large scale surveillance of emerging zoonotic viruses in wildlife. 2nd Bay Area Ecology and Evolution of Infectious Disease Conference, 29 Feb 2020, UC Berkeley, CA, USA.
3. Pandit, P., Kelly, T., Dombrowskli, D., Carion, N., Rogers, K., McMilin, S., Clifford, D., Riberi, A., Ziccardi, M., Johnson, C.K. Early detection of health events through temporal anomalies in wildlife admissions at rehabilitation centers. 68th Annual International Conference of the Wildlife Disease Association, 4 - 9 Aug 2019, Tahoe City, CA USA.
4. Pandit, P., Doyle, M., Young, C., Johnson, C. Where to look for Flaviviruses in Wildlife? Machine learning to inform large scale surveillance of wildlife for emerging Flaviviruses. 68th Annual International Conference of the Wildlife Disease Association, 4 - 9 Aug 2019, Tahoe City, CA USA.
5. Pandit, P., Mazet, J.K., Johnson, C.K. PREDICT Project : Global Insights. Workshop on Zoonotic Disease Pandemic Preparedness for South Asia, Using One Health Platform. Kathmandu, Nepal, 13-15th March 2017.
6. Pandit, P., Ezanno, P., Vergu, E., Dutta, B.L, Arnoux, S., Beaudeau, F., Hoch, T. Dynamic between herd model for Q-fever spread in dairy cattle to quantify the impact of different transmission pathways at the regional scale. 2015 Annual meeting of the Society for Veterinary Epidemiology and Preventive Medicine (SVEPM 2015), 25-27th March 2015.

Research Experience

Current

2020

Centers for Research in Emerging Infectious Diseases (CREID) : EpiCenter for Emerging Infectious Disease Intelligence (EEIDI), National Institute of Allergy and Infectious Disease,

- The EpiCenter for Emerging Infectious Disease Intelligence (EEIDI) brings together a consortium of leading research partners to advance an understanding of viral emergence from wildlife in forests and rapidly urbanizing environments.
- The work will enhance preparedness for disease emergence events in the Congo and Amazon Basin forest regions and support response efforts at the source of emergence. Our multidisciplinary team has expertise in infectious disease epidemiology, virology, human and animal health, medical entomology, disease modeling, and capacity strengthening.

Disease ecology | Disease modeling | Data management | Database development | Surveillance

2020 2016 **PREDICT 2 Pandemic Influenza and Other Emerging Threats, USAID,**

- The goal of the project was to characterize the biological, ecological, and behavioral risk of zoonotic viral transmission and evolution among wild animals, amplification in livestock, and spread using the One Health approach to disease surveillance and control.
- Developed collaborative surveillance network with host country governments in 30 resource-limited countries.

Disease surveillance | Wildlife health | Risk prediction | One Health

2017 2016 **Modeling Health Capacity and Governance for Zoonotic Disease Outbreak Prediction, Defense Threat Reduction Agency, DoD**

- This study provided a data-driven framework for zoonotic disease prediction and applications for data sharing to estimate the risk of zoonotic disease spillover.

Machine learning | Zoonotic risk prediction | Risk prediction | Bio-surveillance

2017 2016 **Anticipating a sylvatic cycle for Zika virus : Identifying animal hosts in Latin America, Vector-borne Disease Pilot Funding Program–2017, UC Davis**

- A pilot study to survey and develop epidemiological data on the prevalence of Zika virus in wildlife hosts in South America.

Bio-surveillance | Mixed models

2015 2012 **MIHMES : Multi-scale modelling, from animal Intra-Host to Metapopulation, of mechanisms of pathogen spread to Evaluate control Strategies, European Regional Development Fund (ERDF),**

- Multi-scale modeling, from animal intra-host to metapopulation, of mechanisms of pathogen spread, to evaluate control strategies..

Agent-based mathematical modeling | network models

Grants and contracts

Current research support

Impacts of rapid landscape change and biodiversity on virus host specificity 2021 - 2026

National Science Foundation

Key personnel | $2500000

EpiCenter for Emerging Infectious Disease Intelligence 2020 - 2025

National Institute of Allergy and Infectious Diseases, Emerging Disease Research Centers grant. UO1

Lead disease ecology and modeling | $8171076

Pending research support

PIPP Phase 1:Trans-disciplinary Innovation in Predictive Science for Emerging Infectious Disease and Spillover 2021 - 2023

National Science Foundation

Key personnel | $1000000

Artificial intelligence to predict bunching behavior in dairy cattle. 2022 - 2023

United States Department of Agriculture

Principal Investigator | $24000

Pandemic Pathogen Pathways and Data Analysis Pipeline for Bio-security 2022 - 2025

UC-National Lab Collaborative Research and Training Awards

Co investigator | $2719350

Previous research support

Anticipating a sylvatic cycle for Zika virus : Identifying animal hosts in Latin America. 2017 - 2018
Vector-borne disease Pilot Funding Program, UC Davis
Lead modeling | $25000

PREDICT 2 Pandemic Influenza and Other Emerging Threats. 2014 - 2020
United States Agency for International Development
Postdoctoral fellow | modeling and surveillance analytics | $121000000

Modeling Health Capacity and Governance for Zoonotic Disease Outbreak Prediction. 2022 - 2025
Defense Threat Reduction Agency DoD
Postdoctoral fellow | modeling and surveillance analytics | $1800000

Grants submitted

Improving detection of wildlife morbidity and mortality events. 2020
Morris Animal Foundation
Principle investigator | $100000

Preparedness for Primate Zoonotic Pathogens of Pandemic Potential in Uganda. 2019
Defense Advance Research Projects Agency DoD
Lead modeler

Teaching

Fall 2021 | **Principles of Epidemiology | EPI 205/MPM 205 School of Veterinary Medicine, UC Davis, USA**
- Instructor on record
- Course covering basics of epidemiology for graduate students
- Master of Preventive Veterinary Medicine (MPVM), MPH, Graduate Group of Epidemiology

Disease frequency | Properties of tests | Study Design | Bias | Surveillance

2021 2016 | **Mathematical modeling of infectious diseases | EPI 277/PHR 277 School of Veterinary Medicine, UC Davis, USA**
- Agent based stochastic modeling and modeling disease
- latency and heterogeneity

Stochasticity | Agent based models | Python | Object oriented modeling

2021 2016 | **Advanced Animal/human Health Leadership | MPM 210 School of Veterinary Medicine, UC Davis, USA**
- Leadership development boot camp
- Master of Preventive Veterinary Medicine

Leadership | Communication | Science Policy

2021 2017 | **Basic Foundations : Population Health| VET 401 School of Veterinary Medicine, UC Davis, USA**
- Problem based learning exercise
- Outbreak investigation

Outbreak | PBL | investigation steps

Guest lectures and seminars

2021 | **Disease and Society | SAS 13, UC Davis, USA**
- SARS-CoV2 spread in a classroom setting

Disease modeling | SARS-CoV2

2019 | **Infectious Diseases of Humans | IDI 141, UC Davis, USA**
- Predicting New Epidemics in Infectious Diseases

Disease emergence | One Health

2019 | **Topics in Public Health | SPH 190, UC Davis, USA**
- Seminar : Data driven models for targeted wildlife surveillance of emerging zoonotic diseases.

Modeling | Wildlife health | Livestock health

2019 | **Ecology, Evolution, and Conservation Biology (EECB) Colloquium, San Francisco State University, USA**
- Where to look for Flaviviruses in Wildlife ?

Flaviviruses | Wildlife Health

2014 | **Basic Epidemiology| ONIRIS, École Nationale Vétérinaire, Agroalimentaire et de l'Alimentation, Nantes, France**
- Master MAN-IMAL One Health Program
- Sampling in descriptive studies

Sampling | Study design

Mentoring and Workshops

6-13 June 2019 | **Introduction to PREDICT data using R | School of Veterinary Medicine, UC Davis, USA**
- Workshop leader
- week-long workshop to train teams field teams in 17 countries in analyzing the PREDICT data collected over five years using R.

R | Descriptive data analysis | Hypothesis generation

2020 – 2016 | **EcoHealthNet 2.0 : One Health Approach to disease ecology research and education | School of Veterinary Medicine, UC Davis, USA**
- NSF funded program for undergraduate and graduate level global research coordination network to bring together research scientist.
- Mentoring of undergraduate and graduate level students working on projects related to emerging infectious disease ecology.

Disease ecology | Undergrad mentoring

Service

2021 | **SARS-CoV2 modeling in classroom setting, UC Davis,**
- Worked closely with the UC Davis Chancellor to understand risk of COVID spread due to in-person classes for Fall 2021 Quarter
- Developed COVID-19 testing policy using mathematical model describing spread of COVID-19 in classroom setting.
- COVID spread in classroom setting.

2020 | **Dashboard compiling live daily SARS-CoV2 cases in counties in California| School of Veterinary Medicine, UC Davis, USA**
- Developed a dashboard showing composite numbers of nearby counties of UC Davis
- Dean's office at the School of Veterinary Medicine UC Davis used it to track COVID-19 cases from areas where students and staff live.
- SARS-CoV2 cases in Californian counties.

Science Communication and media coverage

Selected media coverage

1. Wired Magazine : This AI Helps Detect Wildlife Health Issues in Real Time
2. National Geographic : July 2021 Viral Spillover
3. Hindustan Times : Deforestation, exploitation of wildlife leads to pandemics like Covid-19

4. Geographical Magazine : Predicting the unidentified carriers of zika, dengue and yellow fever
5. Earth Journalism Network webinar : How do scientists detect and prevent viruses with pandemic potential from emerging?
6. From Animals to Humans : Understanding Zoonotic Diseases : Center for Science and Environment, Down to Earth, New Delhi.

References

Christine Kreuder Johnson, VMD, Ph.D.
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