

Lixin Zhang, Ph.D.

Michigan State University
909 Fee Road Rm. 637
East Lansing, MI 48824
(517) 353-8623
email: lxzhang@msu.edu

Education

Ph.D., 1999, Epidemiology, University of Michigan, Ann Arbor.
M.S., 1993, Molecular and Cellular Microbiology, Eastern Michigan University, Ypsilanti, MI
B.E., 1988, Microbiochemical Engineering, Zhejiang Institute of Technology, China

Professional experience

Sep 2014 - Assistant Professor, Department of Epidemiology and Biostatistics, School Of Human Medicine, Michigan State University, East Lansing, MI.
Assistant Professor, Department of Microbiology and Molecular Genetics, Michigan State University, East Lansing, MI
2007 - 2014 Research Assistant Professor, Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI.
1999 - 2007 Assistant Research Scientist, Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI.
1999 - 2014 Faculty member, Center for Molecular and Clinical Epidemiology of Infectious Diseases, Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI.
2002 - 2014 Faculty member, Center for Computational Medicine and Biology (CCMB), University of Michigan, Ann Arbor, MI

Memberships in professional societies

Member, American Public Health Association
Member, American Society for Microbiology
Member, International Epidemiological Association

Current Teaching and advising activities

2016 - EPI 979 / MMG 991 (Advanced Topics in Infectious Disease Epidemiology)
2017 - EPI 817 (Communicable Disease Epidemiology)

Current advising activities at MSU

PhD advisor for:

Ariesti Karmila (Epidemiology)
Dan Dutkiewicz (Epidemiology)
Karla Vasco Aguas (Microbiology and Molecular Genetics)

Master thesis advisor for:

Andrea Sosamorenno (Epidemiology)
Bryant Nummer (Epidemiology)
Jay Liggins (Epidemiology)

Member of the doctoral dissertation committee:

Alexandre Chabrelie (Biosystems & Agricultural Engineering)
John Keven (Microbiology and Molecular Genetics)

Nicholas Kiulia (Fisheries and Wildlife)
 Sanjana Mukherjee (Microbiology and Molecular Genetics)
 Heather Selheimer (Microbiology and Molecular Genetics)
 Hayden Hedman (Natural Resources, UM)
 Zoe Ann Hansen (Microbiology and Molecular Genetics)
 Hinako Terauchi (Microbiology and Molecular Genetics)

Committee and administrative service

Member, MSU Genomic Core Advisory Committee, Michigan State University (2020 – current)
 Member, College of Human Medicine Graduate Studies Committee, Michigan State University (8/16/2019 - 8/15/2021)
 Member, Graduate Program Committee, Department of Epidemiology and Biostatistics, Michigan State University (2018 - current)
 Member, Seminar Committee, Department of Microbiology and Molecular Genetics, Michigan State University (2017 - 2018)
 Member, Recruitment Committee, Department of Epidemiology and Biostatistics, Michigan State University (2014 - current)

Professional activities

Journal Reviewer for: Applied Microbiology and Biotechnology, Journal of Clinical Microbiology, Journal of Infectious Diseases, Applied and Environmental Microbiology, Interdisciplinary Perspectives on Infectious Diseases, Journal of Bacteriology, Antimicrobial Agents and Chemotherapy, Scandinavian J of Urology and Nephrology, Archives of Oral Biology, Journal of Biomedical Science, Clinical and Vaccine Immunology, mBio, Microbial Pathogenesis, Expert Review of Vaccines, FEMS Microbiology Ecology, Genes, mSystems (ASM), International Journal of Environmental Research and Public, Journal of Global Antimicrobial Resistance, American Journal of Epidemiology, Proceedings of the royal society B, Frontiers Microbes, PLOS One, American Journal of Epidemiology

Grant reviewer: Ad hoc reviewer, Diabetes UK Foundation (2014)

Grant reviewer: ANR DFG Cooperation in Natural, Life and Engineering Sciences (France and German joint research funding 2014)

Grant reviewer: NIH Special Emphasis Panel/Scientific Review Group 2016/05 ZAI1 RRS-M (M3) 1

Grant reviewer: NIAID Special Emphasis Panel ZAI1 AWA-M (M1), Nov. 2018

Grant reviewer: MI ECHO review panel (Local Michigan pilot grant program on Prenatal Exposures and Child Health Outcomes: A Statewide Study) May. 2019

Grant reviewer: The Ontario Research Fund – Research Excellence (ORF-RE). Topic: Antimicrobial Stewardship Solutions for a Sustainable Ontario Dairy Industry. Nov. 2019

Grant support

Funded in the last five years:

“Impact of ceftiofur use on antibiotic resistant bacterial populations in dairy cattle”

National Inst of Food & Agriculture; \$ 499,999.89; 2019 - 2022

The goal of this study is to quantify changes in the intestinal microbiome following systemic and intramammary ceftiofur treatments in dairy cows using a longitudinal study. We will determine how specific changes and therapies impact the resistome.

Role: Co-PD

“Antibiotic use during pregnancy and antibiotic resistance in offspring”

Blue Cross Blue Shield of Michigan Foundation; \$70,000.10; 5/2019 – 5/2020

The goal of this study is to generate pilot data on resistome in fecal samples from mother and baby pairs

Role: Co-PD

“Enhanced Understanding of and Potential Response to Variation in Parental Responses to School-Entry Immunization Requirements”

Michigan State University's Institute for Public Policy and Social Research - Michigan Applied Public Policy Research grants. \$16,500.10; 5/2019 – 5/2020

Role: PI

“Prenatal Exposures and Child Health Outcomes: A statewide Study”

National Institutes of Health (1UG3OD023285-01); \$1,307,712; 09/01/16-08/31/23

The goal of this study is to understand how environmental (toxic, nutritional, inflammatory) exposures influence perinatal outcomes, obesity, and neurodevelopment, and investigate whether the effects of exposures on outcomes are mediated and by the placenta and the infant microbiome

Role: Co-I

“Expansion of Microbiome Biospecimen Sample Collection in the Michigan ECHO Cohort to Investigate the Relationship between Maternal Pre-Pregnancy Obesity and the Maternal and Infant Microbiome and Resistome”

Michigan CHARM Internal Grant Program; \$50,000; 2017 – 2018 with extension to 2019

The goals of this project are to 1) expanded biospecimen collection on top of a large population based study and 2) and provide foundational knowledge about the relationship between pre-pregnancy BMI and the maternal and infant microbiomes and resistomes.

Role – Co-I with allocation of \$12,000 for resistome analysis

“U.S.-China Scientific Cooperation Exchange Program #6 - Estimating and Managing Risks of Antibiotic Resistant Bacteria in Agriculture”

USDA FAS Funding Opportunity #: SCEP-2017. Summer 2017; \$5,000

The goal of this program is to exchange scientific knowledge and explore collaborations on antibiotics, resistant organisms and resistance genes in animal products, agricultural crops, and environmental reservoirs, particularly focusing on surveillance methodologies and critical knowledge gaps for estimating and managing risks of antibiotic resistance

Role: one of four MSU investigators

“Antibiotic Resistance Genes in the Environment: Organizing and Expanding MSU Capabilities for Risk Reduction”

Seed Funding Proposal to MSU Center for Health Impacts of Agriculture (CHIA), 2015 – 2017; \$250,000

The goal of this project is to develop laboratory and field tools to study antibiotic resistance spread from agriculture to human.

Role: Co-I

Peer reviewed publications

1. Foxman B, Zhang L, Palin K, Tallman P, Marrs CF. 1995. Bacterial virulence characteristics of *Escherichia coli* isolates from first-time urinary tract infection. J. Infect. Dis. 171:1514-1521.
2. Foxman B, Zhang L, Tallman P, Palin K, Rode C, Bloch C, Gillespie B, Marrs CF. 1995. Virulence characteristics of *Escherichia coli* causing first urinary tract infection predict risk of second infection. J. Infect. Dis. 172:1536-1541.
3. Johnson JR, Russo TA, Brown JJ, Zhang L, Palin K, Bloch C, Marrs CF, Foxman B. 1997. Discovery of a disseminated J96-like clone of uropathogenic *Escherichia coli* O4:H5 containing

- both the papG_{J96} ("class I") and the prsG_{J96} (Class III") Gal(α 1-4)Gal-binding adhesin sequences. J. Infect. Dis. 175:983-988.
4. Foxman B, Zhang L, Tallman P, Andree BC, Geiger AM, Koopman JS, Gillespie BW, Palin KA, Sobel JD, Rode CK, Bloch CA, Marris CF. 1997. Transmission of uropathogens between sex partners. J. Infect. Dis. 175:989-992.
 5. Zhang L, Foxman B, Tallman P, Cladera E, Bouguenec C, Marris CF. 1997. Distribution of *drb* Genes Coding for Dr Binding Adhesins Among uropathogenic and Fecal *Escherichia coli* Isolates and Identification of New Subtypes. Infect. Immun. 65:2011-2018
 6. Foxman B, Gillespie B, Koopman J, Zhang L, Palin K, Tallman P, Marsh JV, Spear S, Sobel JD, Marty MJ, Marris CF. 2000. Risk factors for second urinary tract infection among college women. Am J Epidemiol. 151:1194-205.
 7. Zhang L, Foxman B, Manning S, Tallman P, Marris CF. 2000. Molecular epidemiologic approaches to UTI gene discovery in uropathogenic *Escherichia coli*. Infect. Immun. 68:2009-2015.
 8. Melkerson-Watson LJ, Rode CK, Zhang L, Foxman B, Bloch CA. 2000. Integrated genomic map from uropathogenic *Escherichia coli* J96. Infect. Immun. 68: 5933-5942.
 9. Manning SD, Zhang L, Foxman B, Spindler A, Tallman P, Marris CF. 2001. The Prevalence of known P-fimbrial G-alleles in *Escherichia coli* and the Determination of a New Adhesin Class. Clin. Diag. Lab. Immun. 8:637-640.
 10. Zhang L, Gillespie BW, Marris CF, Foxman B. 2001. Optimization of a fluorescent-based phosphor imaging Dot Blot DNA hybridization assay to assess *E. coli* virulence gene profiles. J. Microbiol. Method. 44:225-233.
 11. Marris CF, Zhang L, Tallman P, Manning S, Somsel P, Raz R, Colodner R, Jantunen ME, Siitonen A, Saxen H, Foxman B. 2002. *Escherichia coli* virulence gene distributions show interesting differences between urinary tract infection, fecal and periurethral isolate collections. J. Med. Microbiol. 51:138-142.
 12. Bauer RJ, Zhang L, Foxman B, Siitonen A, Jantunen ME, Saxen H, Marris CF. 2002. Molecular epidemiology of three putative *Escherichia coli* urinary tract infection virulence genes: *usp*, *iha*, *iroN_{E.coli}*. J. Infect. Dis. 185:1521-1524.
 13. Foxman B, Manning S, Tallman P, Bauer R, Zhang L, Koopman J, Gillespie B, Sobel JD, Marris CF. 2002. Uropathogenic *Escherichia coli* are more likely than commensal *E. coli* to be shared between heterosexual sex partners. Am. J. Epidemiol. 156:1133-1140.
 14. Zhang L, Foxman B, Marris C. 2002. Both urinary and rectal *Escherichia coli* isolates are dominated by strains of phylogenetic group B2. J. Clin. Microbiol. 40:3951-3955.
 15. Zhang L, Foxman B. 2003. Molecular epidemiology of *Escherichia coli* mediated urinary tract infections. Frontiers in Bioscience 8, e235-244.
 16. Meacham JK, Zhang L, Foxman B, Bauer RJ, Marris CF. 2003. Evaluation of genotyping large numbers of *Escherichia coli* isolates by REIC-PCR. J. Clin. Microbio 41:5224-5226.
 17. Farjo RS, Foxman B, Patel M, Zhang L, Pettigrew M, McCoy SI, Marris CF, Gilsdorf JR. 2004. Diversity and sharing of *Haemophilus influenzae* strains colonizing healthy children attending daycare centers. Pediatr Infect Dis J 23.
 18. Gu K, Zhang L, Jin T, Rutherford RB. 2004. Exploration of the coordinate expression of genes with Runx2/Cbfa1 during osteoblastic differentiation of C2C12 cells treated by bone morphogenetic protein (BMP)-7. Cells Tissues Organs 176:28-40. PMID: 14745233
 19. Zhang L, Srinivasan U, Marris CF, Ghosh D, Gilsdorf JR, Foxman B. 2004. Library on a slide for bacterial comparative genomics. BMC Microbiology, 4:12.
 20. France AM, Kugeler KM, Freeman A, Zalewski CA, Blahna M, Zhang L, Marris CF, Foxman B. 2005. Clonal groups and the spread of resistance to trimethoprim-sulfamethoxazole in uropathogenic *Escherichia coli*. Clin Infect Dis. 40:1101-7.
 21. Yang ZH, Yang D, Kong Y, Zhang L, Marris CF, Foxman B, Bates JH, Wilson F, Cave MD. 2005. Clinical relevance of Mycobacterium tuberculosis *p/cD* gene mutations. Amer. J. Respir and Crit Care Med. Jun 15, 171:1436-42. PMC1317199

22. Talarico S, Cave MD, Marrs CF, Foxman B, Zhang L, Yang Z. 2005. Variation of the *Mycobacterium tuberculosis* PE_PGRS33 Gene among Clinical Isolates. *J Clin Microbiol.* 43:4954-60. PMC1248487
23. Marrs CF, Zhang L, Foxman B. 2005. *Escherichia coli* mediated urinary tract infections: Are there distinct uropathogenic *E. coli* (UPEC) pathotypes? *FEMS Microbiol Lett.* 2005 Sep 13.
24. Yang ZH, Durmaz R, Yang D, Gunal S, Zhang L, Foxman B, Sanic A, Marrs CF. 2005. Simultaneous detection of isoniazid, rifampin, and ethambutol resistance of *Mycobacterium tuberculosis* by a single multiplex allele-specific PCR assay. *Diagn Microbiol Infect Dis.*;53(3):201-8..
25. Zhang L, Foxman B, Gilsdorf JR, Marrs CF. 2005. Bacterial genomic DNA isolation for microarray analysis using sonication. *BioTechniques.* BioTechniques 39:640-644.
26. Kong Y, Cave MD, Yang D, Zhang L, Marrs CF, Foxman B, Bates JH, Wilson F, Mukasa LN, Yang ZH. 2005. Distribution of insertion- and deletion-associated genetic polymorphisms among four *Mycobacterium tuberculosis* phospholipase C genes and associations with extrathoracic tuberculosis: a population-based study. *J Clin Microbiol*; 43:6048-53. PMC1317199
27. Foxman B, Zhang L, Koopman JS, Manning SD, Marrs CF. 2005. Choosing an appropriate bacterial typing technique for epidemiologic studies. *Epidemiol Perspect Innov.* 25;2:10.
28. Foxman B, Gillespie B, Manning SD, Howard LJ, Tallman P, Zhang L, Marrs CF. 2006. Incidence and duration of group B *Streptococcus* by serotype among male and female college students living in a single dormitory. *Am J Epidemiol.* 163(6):544-51.
29. Srinivasan U, Zhang L, Frances AM, Ghosh D, Shalaby W, Xie J, Marrs CF, Foxman B. 2007. Probe Hybridization Array typing (PHAT): A novel binary typing method for *E. coli*. *J Clin Microbiol.* 45(1):206-14. PMC1828955
30. Xie J, Foxman B, Zhang L, Marrs CF. 2006. Molecular epidemiologic identification of *Escherichia coli* genes that are potentially involved in movement of the organism from the intestinal tract to the vagina and bladder. *J Clin Microbiol.* 44(7):2434-41. PMC1489509
31. Kong Y, Cave MD, Zhang L, Foxman B, Marrs CF, Bates JH, Yang ZH. 2006. Population-based study of deletions in five different genomic regions of *Mycobacterium tuberculosis* and possible clinical relevance of the deletions. *J Clin Microbiol.* 44(11):3940-6. PMC1698370
32. Kong Y, Cave MD, Zhang L, Foxman B, Marrs CF, Bates JH, Yang ZH. 2007. Association between *Mycobacterium tuberculosis* Beijing/W lineage strain infection and extrathoracic tuberculosis: Insights from epidemiologic and clinical characterization of the three principal genetic groups of *M. tuberculosis* clinical isolates. *J Clin Microbiol.* 45(2):409-14. PMC1829078
33. Gu K, Shah V, Ma C, Zhang L, Yang M. 2007. Cytoplasmic immunoreactivity of thyroid transcription Factor 1 (TTF-1) in hepatocytes: True positivity or cross reaction? *Am J Clin Pathol.* 128(3):382-8.
34. Hebert AM, Talarico S, Yang D, Durmaz R, Marrs CF, Zhang L, Foxman B, Yang Z. 2007. DNA polymorphisms in the *pepA* and *PPE18* genes among clinical strains of *Mycobacterium tuberculosis*: implications for vaccine efficacy. *Infect Immun.* 75(12):5798-805.
35. Zhang L, Reddi U, Srinivasan U, Li S, Borchardt SM, Pillai P, Mehta P, Styka AN, DeBusscher J, Marrs CF, Foxman B. 2008. Combining microarray technology and molecular epidemiology to identify genes associated with invasive group B *Streptococcus*. *Interdiscip Perspect Infect Dis.* Volume 2008, Article ID 314762, 10 pages. doi:10.1155/2008/314762.
36. Sheline KD, France AM, Talarico S, Foxman B, Zhang L, Marrs CF, Bates JH, Cave MD, Yang Z. 2008. Does the *lipR* gene of tubercle bacilli have a role in tuberculosis transmission and pathogenesis? *Tuberculosis (Edinb).* 2008 Nov 20.
37. Talarico S, Zhang L, Marrs CF, Foxman B, Cave MD, Brennan MJ, Yang Z. 2008. Genetic Diversity of *Mycobacterium tuberculosis* PE_PGRS16 and PE_PGRS26 Genes among Clinical Isolates. *Tuberculosis.* Tuberculosis. 88(4):283-94. PMC2562508
38. Sandstedt SA, Zhang L, Patel M, McCrea K, Qin Z, Marrs CF, Gilsdorf JR. 2008. Comparison of laboratory-based and phylogenetic methods to distinguish between *Haemophilus influenzae* and *H. haemolyticus*. *J Microbiol Methods.* 75(2):369-71.
39. Pillai P, Srinivasan U, Zhang L, Borchardt SM, DeBusscher J, Marrs CF, Foxman B. 2009. *Streptococcus agalactiae* pulsed-field gel electrophoresis patterns cross capsular types. *Epidemiol Infect.* 4:1-6. PMID:19257912

40. McNamara SE, Srinivasan U, Zhang L, Whittam TS, Marrs CF, Foxman B. 2009. Comparison of probe hybridization array typing to multilocus sequence typing for pathogenic *Escherichia coli*. *J Clin Microbiol.* 47(3):596-602. PMC2650935.
41. Zhang L, Foxman B, Drake DR, Srinivasan U, Henderson J, Olson B, Marrs CF, Warren JJ, Marazita ML. 2009. Comparative whole-genome analysis of *Streptococcus mutans* isolates within and among individuals of different caries status. *Oral Microbiol Immunol.* 24:197–203.
42. Dalal S, Nicolle L, Marrs CF, Zhang L, Harding G, Foxman B. 2009. Long-term *Escherichia coli* asymptomatic bacteriuria among women with diabetes mellitus. *Clin Infect Dis.* 49(4):491-7. PMC2833278
43. DeBusscher J, Zhang L, Buxton M, Foxman B, C. Barbosa-Cesnik C. 2009. Persistent extended-spectrum beta-lactamase urinary tract infection. *Emerg Infect Dis.* 15(11):1862-4.
44. Sandstedt SA, Marrs CF, Patel M, Hirasawa H, Zhang L, Gilsdorf JR. 2010. Prevalence of *Haemophilus influenzae* Type b Genetic Islands among *Haemophilus haemolyticus*, and Nontypeable *H. influenzae* from Otitis Media or the Throats of Healthy Children. *J Clin Microbiol.* 48(7):2565-8. PMC2897528.
45. Davila J, Zhang L, Marrs CF, Durmaz R, Yang Z. 2010. Assessment of the genetic diversity of *Mycobacterium tuberculosis* *esxA*, *esxH*, and *fbpB* genes among clinical isolates and its implication for the future immunization by new tuberculosis subunit vaccines Ag85B-ESAT-6 and Ag85B-TB10.4. *J Biomed Biotechnol.* 2010:208371. PMC289665.
46. Talarico S, Ijaz K, Zhang X, Mukasa LN, Zhang L, Marrs CF, Cave MD, Bates JH, Yang Z. 2011. Identification of factors for tuberculosis transmission via an integrated multidisciplinary approach. *Tuberculosis (Edinb).* 91(3):244-9. PMC3142560.
47. Srinivasan U, Miller B, Debusscher J, Marrs CF, Zhang L, Seo YS, Oh KY, Kim MY, Yoon HR, KI M, Foxman B. 2011. Identification of a novel keyhole phenotype in double-disk diffusion assays of clindamycin-resistant erythromycin-sensitive strains of *Streptococcus agalactiae*. *Microb Drug Resist.* 17(1):121-4. Epub 2010 Dec 18. PMC3124752.
48. Barbosa-Cesnik C, Brown MB, Buxton M, Zhang L, DeBusscher J, Foxman B. 2011. Cranberry juice fails to prevent recurrent urinary tract infection: results from a randomized placebo-controlled trial. *Clin Infect Dis.* 52(1):23-30. PMC3060891.
49. Yang Z, Rosenthal M, Rosenberg NA, Talarico S, Zhang L, Marrs C, Thomsen VO, Lillebaek T, Andersen AB. 2011. How dormant is *Mycobacterium tuberculosis* during latency? A study integrating genomics and molecular epidemiology. *Infect Genet Evol.* 11(5):1164-7. PMC3104100.
50. Zhang X, Andersen AB, Lillebaek T, Kamper-Jørgensen Z, Thomsen V, Ladefoged K, Marrs CF, Zhang L, Yang Z. 2011. Effect of sex, age, and race on the clinical presentation of tuberculosis: a 15-year population-based study. *Am J Trop Med Hyg.* 85(2):285-90. PMC3144827.
51. Marschall J, Zhang L, Foxman B, Warren DK, Henderson JP. 2012. Both Host and Pathogen Factors Predispose to *Escherichia coli* Urinary-Source Bacteremia in Hospitalized Patients. *Clin Infect Dis.* 54(12):1692-1698. PMC3357479.
52. Wen A, Goldberg D, Marrs CF, Weyant R, Marazita M, Srinivasan U, Zhang L, Crout R, McNeil DW, Foxman B. 2012. Caries resistance as a function of age in an initially caries-free population. *J Dent Res.* 91(7):671-675. PMID: 22668596
53. Zhang L, Xie J, Patel M, Bakhtyar A, Ehrlich GD, Ahmed A, Earl J, Marrs CF, Clemans D, Murphy TF, Gilsdorf JR. 2012. Nontypeable *Haemophilus influenzae* genetic islands associated with chronic pulmonary infection. *PLoS One.* 7(9):e44730. doi: 10.1371. PMC3435294.
54. Zhang L, Patel M, Xie J, Davis GS, Marrs CF, Gilsdorf JR. 2013. Urease Operon and Urease Activity in Commensal and Disease-Causing Nontypeable *Haemophilus influenzae*. *J Clin Microbiol.* 51(2):653-5. PMC3553914
55. Marschall J, Piccirillo ML, Foxman B, Zhang L, Warren DK, Henderson JP; CDC Prevention Epicenters Program. 2013. Patient characteristics but not virulence factors discriminate between asymptomatic and symptomatic *E. coli* bacteriuria in the hospital. *BMC Infect Dis.* 13:213. doi: 10.1186/1471-2334-13-213.
56. Eutsey RA, Hiller NL, Earl JP, Janto BA, Dahlgren ME, Ahmed A, Powell E, Schultz MP, Gilsdorf JR, Zhang L, Smith A, Murphy TF, Sethi S, Shen K, Post JC, Hu FZ, Ehrlich GD. 2013. Design and

- validation of a supragenome array for determination of the genomic content of *Haemophilus influenzae* Isolates. BMC Genomics. 14(1):484.
57. Dang NDT, Zhang L, Zöllner S, Srinivasan U, Khadija A, Marrs CF, Foxman B. 2013. Uropathogenic *Escherichia coli* are less likely than paired fecal *E. coli* to have CRISPR loci. Infect Genet Evol. 19:212-8. doi: 10.1016. PMC23891665
 58. Foxman B, Srinivasan U, Wen A, Zhang L, Marrs CF, Goldberg D, Weyant R, McNeil D, Crout R, Marazita M. 2014. Exploring the effect of dentition, dental decay and familiarity on oral health using metabolomics. Infect Genet Evol. 22:201-7. doi: 10.1016.
 59. McCrea KW, Xie J, Daniel D, Ulrich-Lewis J, Zhang L. 2014. Predicted configurations of oligosaccharide extensions in the lipooligosaccharide of non-typeable *Haemophilus influenzae*. J Clin Microbiol. 52(7):2659-61. PMC4097733
 60. Dang TN, Srinivasan U, Britt Z, Marrs CF, Zhang L, Ki M, Foxman B. Efflux-mediated Resistance Identified Among Norfloxacin Resistant Clinical Strains of Group B Streptococcus From South Korea. Epidemiol Health. 2014 Oct 11. doi: 10.4178/epih/e2014022.
 61. Davis GS, Patel M, Hammond J, Zhang L, Dawid S, Marrs CF, Gilsdorf JR. Prevalence, distribution, and sequence diversity of hmwA among commensal and otitis media non-typeable *Haemophilus influenzae*. Infect Genet Evol. 2014 Oct 5. pii: S1567-1348.
 62. Hariadi NI, Zhang L, Patel M, Sandstedt SA, Davis GS, Marrs CF, Gilsdorf JR. 2015. Comparative profile of heme acquisition genes in disease-causing and colonizing nontypeable *Haemophilus influenzae* and *Haemophilus haemolyticus*. J Clin Microbiol. 53(7):2132-7. PMC4473220
 63. Lo Y, Zhang L, Foxman B, Zöllner S. 2015. Whole-genome sequencing of uropathogenic *Escherichia coli* reveals long evolutionary history of diversity and virulence. Infect Genet Evol. 34:244-50. doi: 10.1016/j.meegid. PMC4530057.
 64. Zhang L, Levy K, Trueba G, Cevallos W, Trostle J, Foxman B, Marrs CF, Eisenberg JN. 2015. The effects of selection pressure and genetic association on the relationship between antibiotic resistance and virulence in *Escherichia coli*. Antimicrob Agents Chemother. 59:6733-40. PMC4604409.
 65. Armas-Freire P, Trueba G, Proaño-Bolaños C, Levy K, Zhang L, Marrs CF, Cevallos W, Eisenberg JN. 2015. Unexpected distribution of the fluoroquinolone resistance gene qnrB in *Escherichia coli* isolates from different human and poultry origins in Ecuador. Int Microbiol 18:85-90. PMID: 26496615.
 66. Bhavnani D, Bayas Rde L, Lopez VK, Zhang L, Trueba G, Foxman B, Marrs C, Cevallos W, Eisenberg JN. 2016. Distribution of Enteroinvasive and Enterotoxigenic *Escherichia coli* across space and time in Northwestern Ecuador. Am J Trop Med Hyg. 94(2):276-84. PMID:26643532.
 67. Braykov NP, Eisenberg JNS, Grossman M, Zhang L, Vasco K, Cevallos W, Muñoz D, Acevedo A, Moser KA, Marrs CF, Foxman B, Trostle J, Trueba G, Levy K. 2016. Antibiotic resistance in animal and environmental samples associated with small-scale poultry farming in Northwestern Ecuador. mSphere 1(1):e00021-15. doi:10.1128/mSphere.00021-15.
 68. Graham SE, Zhang L, Ali I, Cho YK, Ismail MD, Carlson HA, Foxman B. 2016. Prevalence of CTX-M extended-spectrum beta-lactamases and sequence type 131 in Korean blood, urine, and rectal *Escherichia coli* isolates. Infect Genet Evol. 41:292-5.
 69. Myers A, Jackson AM, Zhang L, Gilsdorf J. 2017. *Haemophilus influenzae* type b (Hib) Invasive Disease in Amish Children, Missouri 2014. Emerg Infect Dis. 23(1):112-114. PMID: 27983486.
 70. Zhang L, Yang Z. 2017. Whole-Genome Sequences of *Mycobacterium tuberculosis* TB282 and TB284, a widespread and a unique strain identified in a previous study of tuberculosis transmission in central Los Angeles. Genome Announc. 12;5(2). PMID: 28082486
 71. Perez-Martinez AP, Ong E, Zhang L, Marrs CF, He Y, Yang Z. 2017. Conservation in gene encoding *Mycobacterium tuberculosis* antigen Rv2660 and a high predicted population coverage of H56 multistage vaccine in South Africa. Infect Genet Evol. S1567-1348(17)30329-5. PMID: 28941991
 72. Graham JP, Eisenberg JNS, Trueba G, Zhang L, Johnson TJ. 2017. Small-scale food animal production and antimicrobial resistance: Mountain, molehill, or something in-between? Environ Health Perspect. 125(10):104501. PMID: 2903809
 73. Moser K, Zhang L, Spicknall I, Braykov NP, Levey K, MarrsCF, Foxman B, Trueba G, Cevallos W, Goldstick J, Trostle J, Eisenberg JNS. 2018. The role of genetic mobile elements in the spread of *E.*

- coli* antibiotic resistance from chickens to humans in small-scale production chicken farms in rural Ecuador. *Am J Epidemiol.* 187:558-567.
74. Regasa B, Abebe T, Zhang L, Mihret A, Abebe W, Amogne W. 2018. Drug resistance and plasmid analysis of uropathogenic *Escherichia coli* among urinary tract infection patients in Addis Ababa. *The Journal of Infection in Developing Countries.* *J Infect Dev Ctries* 2018; 12(8):608-615. doi:10.3855/jidc.9916
 75. Guo X, Stedtfeld, Hedman H, Eisenberg J, Truebac G, Yin D, Tiedje J, Zhang L. 2018 Antibiotic resistome associated with small-scale poultry production in rural Ecuador. *Environ Sci Technol.* 52:8165-8172.
 76. Hedman HD, Eisenberg JNS, Vasco KA, Blair CN, Trueba G, Berrocal VJ, Zhang L. 2019. High prevalence of extended-spectrum beta-lactamase CTX-M-producing *Escherichia coli* in small-scale poultry farming in rural Ecuador. *Am J Trop Med Hyg.* 100(2):374-376.
 77. Hedma HD, Eisenberg JN, Trueba G, Vinueza Rivera DL, Zurita Herrera RA, Villacis Barraqueta J, Gavilanes Rodriguez GI, Krawczyk E, VBerrocal VJ, Zhang L. 2019. Small-scale chicken farming activity increased antimicrobial-resistant *Escherichia coli* carriage over time in backyard chickens and humans in rural Ecuador. *Pre One Health.* Dec; 8: 100112.

Manuscripts under review and Preparation

78. Regasa B, Abebe T, Zhang L, Mihret A, Abebe W, Amogne W. Molecular characterization of virulence genes and phylogenetics of uropathogenic *Escherichia coli* among urinary tract infection patients in selected health facilities of Addis Ababa, Ethiopia. *BMC Microbiology.*
79. Hedman HD, Zhang L, Trueba G, Vinueza Rivera DL, Zurita Herrera RA, Villacis Barraqueta J, G. I. Gavilanes Rodriguez GI, Butt B, Fofopoulos J, Berrocal VJ, Eisenberg JN. Spatial exposure of agricultural antimicrobial resistance in relation to free-range domestic chicken (*Gallus gallus domesticus*) movement patterns among agricultural communities in Ecuador. *Epidemiology & Infection.*
80. Fernanda LV, Alejandro T, Zhang L, Trueba G. Withdraw of prophylactic antimicrobials does not change the pigs resistome along the productive life. *BMC Veterinary Research.*
81. Poudel A, Kang Y, Mandal RK, Kalalah A, Butaye P, Hathcock T, aul Walz P, Macklin K, Cattley R, Price SB, Kelly P, Adekanmbi F, Zhang L, Kaltenboeck B, Wang C. Comparison of microbiomes and antimicrobial resistance genes in flies and feces of sympatric animals. *FEMS Microbiology Ecology*
82. Sosa-Moreno A, Comstock SS, Sugino KY, Ma T, Paneth N, Zhang L. Antimicrobial use during pregnancy and its effect on mother and infant fecal resistome. *PLOSone.*

Meeting Presentations, Panel Discussions (a selected samples from over 90 abstracts)

1. Zhang L, VandenBosch JL. Temperature-regulated TnphoA fusions in *Salmonella typhimurium* exhibiting decreased serum-resistance include insertions in *traT*. ASM General Meeting, Las Vegas, NV, May 1994.
2. Zhang L, Foxman B, Bouguenec C LE, Marr CFs. Distribution of *drb* genes coding for Dr binding adhesins among uropathogenic *Escherichia coli* isolates and identification of new subtypes. ASM General Meeting, New Orleans, LA, May 1996.
3. Zhang L, Foxman B, Tallman P, Marrs CF. Molecular epidemiological approaches to *E. coli* UTI gene discovery. ASM General Meeting, Chicago, IL. May 1999.
4. Zhang L (Panelist), Session on "Public policy on antibiotic resistance: The role of genetics: Third Annual Public Health Symposium: Genetics in Public Health: Connecting Research, Education, Practice and Community, The University of Michigan School of Public Health. 2000.
5. Bartlett PC, Mesman S, Sienko D, Zhang L, Park JD, Kaneene J, Stobierski MG, Bernardo T, Tilden J. Foodborne outbreak early detection system (FOEDS). First Annual Michigan Life Sciences Corridor Conference. Novi, Michigan. March 28, 2001
6. Zhang L, Gillespie BW, Marrs CF, Foxman B. Optimization of a fluorescent-based phosphor imaging dot blot DNA hybridization assay to assess *E. coli* virulence gene profiles. Congress of Epidemiology, Toronto, Canada. June 2001.

7. Borchardt SM, Zhang L, McCoy SI, Tallman P, Marrs CF, Foxman B. Genetic diversity of group B *Streptococcus* in college students. IDSA. Chicago, November 2002.
8. Zhang L, Srinivasan U, Marrs CF, Ghosh D, Gilsdorf JR, Foxman B. Library on a glass slide: Creating bacteria collection microarrays for assessing genetic diversity of pathogenic species. IDSA, San Diego, October 2003.
9. France AM, Zhang L, Ghosh D, Foxman B, Marrs CF. Molecular typing of *E. coli* isolates using probe hybridization array typing (PHAT). ICEID, Atlanta, February 2004.
10. Zhang L, Foxman B, Drake D, Henderson J, Srinivasan U, Weyant RJ, Marazita ML. Comparative whole-genome analysis of *Streptococcus mutans* from different caries status. 85th Meeting of the International Association for Dental Research / 36th Meeting of American Association of Dental Research, New Orleans, March, 2007.
11. Barbosa-Cesnik C, Zhang L, Miller B, Cho YK, Buxton M, Debusscher J, Foxman B. Persistent vaginal and rectal colonization of urinary tract infection causing *E. coli* for up to six months post infection. 48th Annual Interscience Conference on Antimicrobial Agents and Chemotherapy/46th Annual Meeting of the Infectious Diseases Society of America. Washington, DC, October 25, 2008
12. Zhang L, Goldstick JE, Zelner JL, Levy K, Bhavnani D, Marrs CF, Foxman B, Trueba G, Eisenberg JN. Genotype distribution and regional transmission of *E. coli* pathogens. Evolution and Ecology of Infectious Disease meeting. Madison, WI, March 2011.
13. Zhang L, Levy K, Trueba G, Eisenberg JNS, Gabriel, The relationship between the antibiotic resistance and virulence of *Escherichia coli*: A community-based study in rural Ecuador. 62nd Annual Meeting of American Society of Tropical Medicine and Hygiene, Washington, DC, November 2013 (Oral presentation).
14. Zhang L, Levy K, Trueba G, Cevallos W, Eisenberg JN. *E. coli* diversity and transmission of pathogens in Northwestern Ecuador: Spatial trends across a landscape. 12th International Conference on Molecular Epidemiology and Evolutionary Genetics of Infectious Diseases 11-13 December, 2014, Bangkok Thailand (Oral presentation). Served as the symposium Section Chair for Molecular epidemiology – bacteria.
15. Myers A, Jackson AM, Zhang L, Gilsdorf J. *Haemophilus influenzae* type b (Hib) Invasive Disease in Amish Children, Missouri 2014. The Infectious Diseases Society of America (IDSA). IDWeek 2015 San Diego, CA – October 7-11, 2015
16. Guo X, Wang F, Yang L, Etchebarne B, Zhang L, Norby B, Vital M, Stedtfeld R, Tiedje J. High-throughput quantification of antibiotic resistance genes from multiple environments. 16th International Symposium on Microbial Ecology. 21-26 August 2016.
17. Moser K, Zhang L, Spicknall I, Levey K, MarrsCF, Foxman B, Trueba G, Cevallos W, Trostle J, Eisenberg JNS. Production farms, class-one integrons, and antibiotic resistance in *E. coli* isolates from rural Ecuadorean chickens and humans. 65th Annual Meeting of the American Society of Tropical Medicine and Hygiene, 13 - 17 November 2016, Atlanta.
18. Hedman H, Blair C, Nickas D, Meda S, Vasco Aguas K, Trueba G, Foufopoulos Joseph Eisenberg J, Zhang L. Field observational study evaluating the spillover of antibiotic-resistant *Escherichia coli* between different varieties of chickens and rural in northern Ecuador. ASM General Meeting 2017. New Orleans, LA. June 2017.
19. Guo X, Stedtfeld R, Hedman H, Eisenberg J, Tiedje J, Zhang L. Antibiotic resistome and microbiome in production and household chickens in rural Ecuador. ASM General Meeting 2017. New Orleans, LA. June 2017.
20. Hedman H, Zhang L, Trueba G, Eisenberg. Ecology of *E. coli* antibiotic resistance associated with chicken production. Poster Presentation: Ecology & Evolution of Infectious Diseases, Santa Barbara, CA. June 2017.
21. Hedman H, Trueba G, Eisenberg J, Zhang L. Evaluating the spillover of antibiotic-resistant *Escherichia coli* between chickens and humans in rural northern Ecuador. The 4th International Symposium on the Environmental Dimensions of Antibiotic Resistance, Lansing, MI. August 2017. (Oral presentation)
22. Chabrelie A, Zhang L, Bornhorst G, Mitchell J. Horizontal Gene Transfer under Dynamic System Conditions for Understanding Dose-Response Relationships for Antibiotic Resistance Risks. Society for Risk Analysis (SRA) 2017 Annual Meeting, December 10-14, 2017. Arlington, VA

23. Hedman H, Vasco Aguas K, Trueba G, Eisenberg J, Zhang L. Longitudinal field study in evaluating the spillover of antibiotic-resistant *Escherichia coli* from poultry to human. International Conference on Emerging Infectious Diseases, Atlanta, GA. August 2018.
24. Hedman H, Trueba G, Eisenberg J, Zhang L. Longitudinal field Study Evaluating the Spillover of Antibiotic-Resistant *Escherichia coli* from Poultry to Humans in Ecuador. American Society of Microbiology, Atlanta, GA. June 2018. (Oral & poster presentation)
25. Hedman H, Trueba G, Eisenberg J, Zhang L. Title: Evaluating the ecological spillover of antibiotic-resistance from poultry to humans in rural Ecuador: A longitudinal study. 5th International One Health Congress, Saskatoon, Canada. June 2018. (Oral presentation)
26. Sosa-Moreno A, Comstock SS, Sugino KY, Ma T, Paneth N, Zhang L. Antimicrobial Use during Pregnancy and Its Effect on Mother and Infant Fecal Resistome: A Cohort Study. Michigan Epidemiology Conference. March 2019.
27. Hedman H, Vasco Aguas K, Qiu T, Trueba G, Eisenberg J, Zhang L. "Chickling dumping": risk of promoting rural communities with antimicrobial resistance genes and resistant pathogens. The 5th International Symposium on the Environmental Dimensions of Antibiotic Resistance, Hong Kong, June 2019.
28. Sosa-Moreno A, Comstock SS, Sugino KY, Ma T, Paneth N, Zhang L. Antimicrobial Use during Pregnancy and Its Effect on Mother and Infant Fecal Resistome. ASM Microbe 2019. San Francisco, June 2019.
29. Monge N, Trueba G, Hedman H, Zhang L. Surveillance of Avian Pathogenic *Escherichia coli* in poultry and children in remote Ecuador. ASM Microbe 2019. San Francisco, June 2019.