

# Zaara Ishaq

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**Date of Birth:** Jan 05, 1997

**Location:** Islamabad, Pakistan.

[Google Scholar](#)

[ORCID](#)

[Scopus](#)

[ResearchGate](#)

## EDUCATION

Duration	Degree	Institution
2021-2029*	PhD Applied Biosciences (CGPA 3.50/4.0)	National University of Sciences Technology (NUST), Islamabad, Pakistan.
2018-2020	MS Industrial Biotechnology (CGPA 3.70/4.0)	National University of Sciences Technology (NUST), Islamabad, Pakistan.
2014-2018	BS Biotechnology (CGPA 3.69/4.0)	Bahauddin Zakariya University (BZU), Multan, Pakistan.
2012-2014	Intermediate Medical Group (Percentage 86%)	Punjab College for Girls, Mian Channu, Pakistan.
2010-2012	Matric Science Group (Percentage 93%)	Govt. Girls Model High School, Mian Channu, Pakistan.

## EXPERIENCE

- Management Trainee Officer (MTO) at NUST School of Health Sciences (NSHS). (May 2025-Present)
- Bioinformatics specialist at MGBIO (SMC Private) Ltd. (March 2025-Present)

## MEMBERSHIPS

1. International Society for Computational Biology (ISCB)
2. American Society of Microbiology (ASM)
3. BactiVac Network
4. Asian Federation of Biotechnology (AFOB)

## AWARDS

1. “Indigenous PhD Fellowship for 5000 Scholars, Phase II, Batch VI” in MS enrolled category by Higher Education Commission of Pakistan. (2021)
2. Chief Minister’s Punjab Educational Endowment Fund Merit Scholarship. (2012)

## RESEARCH EXPERTISE

- **Molecular Biology:** DNA extraction, PCR, gel electrophoresis, DNA quantification, cloning, transformation, SDS-PAGE, western blotting, ELISA.
- **Microbiology:** Microbial culture handling, streaking, spreading, gram staining, antimicrobial susceptibility testing, biochemical analysis.
- **Comparative Genomics:** WGS analysis, phylogenetic analysis, bacterial genomic epidemiology.
- **In-silico Vaccine Design:** Multi-epitope and antigenic protein domain-based vaccines.
- **Technical Skills:** Python, R, data analysis, machine learning models.

## PUBLICATIONS

1. **Ishaq, Z.**, Sami, A., Batool, TS., and Waheed, Y. Blood-borne and parasitic infections: role of phytoformulations, *Sustainable Healthcare: Traditional Knowledge and Current Challenges*, SpringerNature, 1<sup>st</sup> Edition (2026).
2. **Ishaq, Z.**, Haider, U., Shahid, F., Faiz, F., Maheen, K., Manzoor, K., Siddique, A., and Ali, A. Combating antibiotic resistance with smart algorithms: “Promising role of artificial intelligence and machine learning”, *Tackling Antibiotic Resistance, Combating Bacterial Infection*, CRC Press, Taylor and Francis Group. 1<sup>st</sup> Edition (2026).
3. **Ishaq, Z.**, Khalil, K., Faiz, F., Haider, U., Nasir, S., Qayyum, H., and Ali, A. Genomic characterization and comparative analysis of multidrug-resistant uropathogenic *Escherichia coli* strain U1 from Pakistan

- revealed ST131 as dominant clade, *Antonie van Leeuwenhoek* 119. 22 (2026). <https://doi.org/10.1007/s10482-025-02233-2>.
4. Ali, A., Hamid, MHB., Nasir, S., **Ishaq, Z.** and Anwer, F. B-vac a robust software package for bacterial vaccine design, *Scientific Reports*. 15, 31745 (2025). <https://doi.org/10.1038/s41598-025-01201-0>.
  5. Qayyum, H., **Ishaq, Z.**, Ali, A., Kayani, MUR., and Huang, L. Genome-resolved metagenomics from short-read sequencing data in the era of artificial intelligence, *Functional & Integrative Genomics*. 2025; 25 (1): 1-21. <https://doi.org/10.1007/s10142-025-01625-x>.
  6. **Ishaq, Z.**, Faiz, F., Haider, U., and Ali, A. Artificial intelligence and machine learning techniques applied to microbiology, *Microbiology in the Era of Artificial Intelligence, Nanotechnology, Quantum and Next Generation Sequencing*, CRC Press, Taylor and Francis Group. 1<sup>st</sup> Edition, 17/04/2025, ISBN 9781032712376. <http://doi.org/10.1201/9781003410164-15>.
  7. Nasir, S., Anwer, F., **Ishaq, Z.**, Saeed, MT., and Ali, A. VacSol-ML(ESKAPE): machine learning empowering vaccine antigen prediction for ESKAPE pathogens, *Vaccine*. 2024; 42 (22): 1-10. <https://doi.org/10.1016/j.vaccine.2024.126204>.
  8. Nasir, S., **Ishaq, Z.**, Fatima, S., Zaheer, T., Qayyum, H., and Ali, A. Screening of potential vaccine candidates through machine learning approach, *Reverse Vaccinology: Concept, Methods and Advancement*, Elsevier. 1<sup>st</sup> Edition, 30/05/2024, ISBN: 9780443133954. <https://doi.org/10.1016/B978-0-443-13395-4.00016-2>.
  9. **Ishaq, Z.**, Zaheer, T., Waseem, M., Awan, HS., Ullah, N., AlAsmari, AF., AlAsmari, F., and Ali, A. Immunoinformatics aided designing of a next generation poly-epitope vaccine against uropathogenic *Escherichia coli* to combat urinary tract infections, *Journal of Biomolecular Structure and Dynamics*. 2023; 1-21, <https://doi.org/10.1080/07391102.2023.2266018>.
  10. Fatima, S., Akbar, A., Irfan, M., Shafee, M., Ali, A., **Ishaq, Z.**, Raza, SK., Samad, A., MY., Alshammari and Hassan, SS. Virulence factors and antimicrobial resistance of Uropathogenic *Escherichia coli* EQ101 UPEC isolated from UTI patient in Quetta, Balochistan, Pakistan, *BioMed Research International*. 2023; <https://doi.org/10.1155/2023/7278070>.
  11. Fatima, S., **Ishaq, Z.**, Irfan, M., AlAsmari, AF., Achakzai, AF., Zaheer, T., Ali, A. and Akbar, A. Whole-genome sequencing of multidrug resistance *Salmonella Typhi* clinical strains isolated from Balochistan, Pakistan, *Frontiers in Public Health*. 2023; <https://doi.org/10.3389/fpubh.2023.1151805>.
  12. Ullah, N., Nasir, S., **Ishaq, Z.**, Anwer, F., Raza, T., Rahman, M., Alshammari, A., Alharbi, M., Bae, T., Rahman, A., Ali, A. Comparative genomic analysis of a panton-valentine leukocidin-positive ST22 community-acquired Methicillin-Resistant *Staphylococcus aureus* from Pakistan. *Antibiotics*. 2022; 11(4):496. <https://doi.org/10.3390/antibiotics11040496>.
  13. Ullah, N., Anwer, F., **Ishaq, Z.**, Siddique, A., Shah, MA., Rahman, M., Rahman, A., Mao, X., Jiang, T., Lee, BL., Bae, T., Ali, A. In silico designed *Staphylococcus aureus* B-cell multi-epitope vaccine did not elicit antibodies against target antigens suggesting multi-domain approach. *Journal of Immunological Methods*. 2022; 504, 113264. <https://doi.org/10.1016/j.jim.2022.113264>.
  14. Zaheer, T., Waseem, M., Waqar, W., Dar, H. A., Shehroz, M., Naz, K., **Ishaq, Z.**, Ahmad, T., Ullah, N., Bakhtiar, S. M., Muhammad, S. A., & Ali, A. Anti-COVID-19 multi-epitope vaccine designs employing global viral genome sequences. *PeerJ*. 2020; 8, e9541. <https://doi.org/10.7717/peerj.9541>.

## PROJECTS

- Immunoinformatics and machine learning based strategies to combat uropathogenic *Escherichia coli* infections. (Ongoing)
- Review on AI/ML advancement in the field of vaccine development. (Ongoing)
- Investigation of antimicrobial activity in *Hermetia illucens* larval hemolymph in response to bacterial stress. (2024)
- Whole-genome sequencing and comparative genome analysis of multi-drug resistant *Acinetobacter baumannii* clinical strains isolated from Rawalpindi and Peshawar, Pakistan. (2023)
- Comparative genome analysis of *Klebsiella pneumoniae* strain KP3 isolated from a local patient. (2023)
- Comparative genome analysis of a local uropathogenic *Escherichia coli* strain U1 collected from a hospital in Rawalpindi. (2022)

## INTERNSHIP

- 4 Weeks Internship at the Clinical Chemistry and ELISA Laboratories, Department of Pathology, Nishtar Medical College Multan, Pakistan. (2016)

## **PRESENTATIONS**

1. Poster presentation at 15<sup>th</sup> Biennial International Conference of the Pakistan Society for Biochemistry and Molecular Biology “Trends in Molecular Sciences” at School of Biological Sciences, The University of Punjab, Lahore, Pakistan. (2025)
2. Poster presentation at “International Conference on Integrative Life Sciences (ICiLS 2024)” at ASAB, NUST, Islamabad, Pakistan. (2024)
3. Poster presentation at “International Conference on Current Trends, Prospects & Opportunities in Vaccine Research” at Centre of Excellence in Molecular Biology, Lahore, Pakistan. (2024)
4. Poster presentation at 13<sup>th</sup> International Public Health Conference “Shaping Healthcare Through Evidence: Pioneering Solutions for Disease Prevention and Control” at Health Services Academy, Islamabad, Pakistan. (2023)
5. Guest speaker at Initiative Awareness webinar “Environmental Conservation and Stability: Clean and Green Mian Channu” a project supported by global UGRAD-Pakistan and IREX and funded by United States. (2023)

## **VOLUNTARY LEARNING & PROFESSIONAL DEVELOPMENT**

1. 2-Days Online Training “Statistical Analysis using SPSS” by RSG Pakistan, International Society for Computational Biology. (2025)
2. Basic Life Support (CPR and AED) Provider Program by American Heart Association. (2025)
3. 6 Weeks NCEAC-HEC Generative AI and Application Development Training program Cohort 1 offered by Pak Angels and its partners. (2025)
4. 5-Days Hands-on National Workshop on “Production & Purification of Recombinant Proteins” organized by School of Biological Sciences, University of the Punjab, Lahore, Pakistan. (2025)
5. 2-Days Hands-on Training “Microbiology: From Basics to Practical Applications” organized by Microbiology Lab & API Research Group, Pakistan Council of Scientific & Industrial Research (PCSIR) Labs, Islamabad, Pakistan. (2025)
6. 2-Days Participation in the Global Health Systems & AI Hackathon 2025, the Pakistan Hub at National Science & Technology Park (NSTP), Islamabad, Pakistan. (2025)
7. 2-Days Online Training by BactiVac: Journal Article Writing Course - BactiVac Network, University of Birmingham, UK. (2025)
8. 2-Days Online Training by BactiVac: Communicating Research to Non-Specialist Audiences Course - BactiVac Network, University of Birmingham, UK. (2025)
9. 10 Weeks Online Training in UI/UX Design under e-Rozgaar Programme Powered by Punjab Information Technology Board, Pakistan. (2023)
10. 5 Weeks Online Non-credit Course offered through Coursera “Foundations: Data, Data, Everywhere” by Google. (2023)
11. 4 Weeks Online Non-credit Course offered through Coursera “Python For Genomic Data Science” by Johns Hopkins University. (2022)
12. 12 Weeks Online Training in Communication and Soft Skills under DigiSkills Training Program DSTP2.0, Batch-02 offered by Virtual University and Ministry of Information Technology and Telecom, Pakistan. (2022)
13. 12 Weeks Online Training in Creative Writing under DigiSkills Training Program DSTP2.0, Batch-02 offered by Virtual University and Ministry of Information Technology and Telecom, Pakistan. (2022)
14. 6 Weeks Online Non-credit Course offered through Coursera “Crash Course on Python” by Google. (2022)
15. 5 Weeks Online Non-credit Course offered through Coursera “Whole Genome Sequencing of Bacterial Genomes-Tools and Application” by Technical University of Denmark (DTU). (2021)
16. 12 Weeks Online Training in Online Content Marketing and Advertising (Non-Technical Group) under e-Rozgaar Programme Powered by Punjab Information Technology Board, Pakistan. (2021)
17. 12 Weeks Online Training in Graphic Design under DigiSkills Training Program Batch-10 offered by Virtual University and Ministry of Information Technology and Telecom, Pakistan. (2021)
18. 12 Weeks Online Training in Course Freelancing under DigiSkills Training Program Batch-10 offered by Virtual University and Ministry of Information Technology and Telecom, Pakistan. (2021)
19. 3-day online training “Entrepreneur Growth and Fundraising Trainings for Women Entrepreneurs” organized by Takhleeq Business Incubator-University of Central Punjab (UCP), Lahore, Pakistan. (2021)
20. Online training “HEC Digital Library Collections for Your Next Scholarly Research” organized by

- ProQuest Education in partnership with Higher Education Commission (HEC), Pakistan. (2020)
21. Online training session “How to Utilize ProQuest Journals, Dissertations and Varied Content Types in Training and Research” organized by ProQuest Education in partnership with HEC, Pakistan. (2020)
  22. Online training session “How to Utilize ProQuest Ebooks Collection in Teaching and Research” organized by ProQuest Education in partnership with HEC, Pakistan. (2020)
  23. Online training session “How to Manage Your Reference Using RefWorks” organized by ProQuest Education in partnership with HEC, Pakistan. (2020)
  24. Online training session “5 Tips for Getting Published: Maximize your Chances to Get Your Paper Accepted in Academic Journal!” organized by ProQuest Education in partnership with HEC, Pakistan. (2020)

## CONFERENCES/SEMINARS/WEBINARS/WORKSHOPS

1. Virtual participation in Hybrid Symposium “Preventing Inherited Disorders in Consanguineous Populations: A Framework for Action” organized by OIC- COMSTECH, Islamabad, Pakistan. (2025)
2. Virtual participation in Webinar on “Recent Trends and Applications of Metabolomics in Food Analysis, Authentication, Process Monitoring and Gut Interactions” organized by OIC-COMSTECH, Islamabad, Pakistan. (2025)
3. Participation in Workshop “Drug Discovery and Development in Modern Era” organized by OIC-COMSTECH, Islamabad, Pakistan. (2025)
4. Facilitator in “Hand-on Workshop Bacterial Identification and Metagenomes” at “3<sup>rd</sup> International Conference on Science, Technology & Innovation” at Kinnaird College for Women, Lahore, Pakistan. (2025)
5. Volunteer in “Hands-on Workshop Coding for Biologists” organized by MGBIO & DenseFusion at School of Interdisciplinary Engineering & Sciences (SINES), National University of Sciences and Technology (NUST), Islamabad, Pakistan. (2025)
6. Participation in “International Conference on Integrative Life Sciences (ICiLS 2024)” at Atta-ur-Rahman School of Applied Biosciences (ASAB), NUST, Islamabad, Pakistan. (2024)
7. Participation in “International Conference on Current Trends, Prospects & Opportunities in Vaccine Research” at Centre of Excellence in Molecular Biology, Lahore, Pakistan. (2024)
8. Reinforcing Capacities of Stakeholders in Innovative Technologies to Develop a Critical Mass at the Level of the Member States: ICESCO’s 1<sup>st</sup> International Next Generation Sequencing Data Analysis Workshop “Building Tomorrow’s Global Genomic Force” organized by ICESCO Morocco, INTERGEN Turkey and COMSATS Pakistan. (2023)
9. Webinar on the “Patent Cooperation Treaty (PCT) and Youth” organized by the World Intellectual Property Organization (WIPO) in cooperation with the Intellectual Property Organization (IPO), Pakistan and the Department of Patents, Designs and Trademarks (DPTD), Bangladesh. (2023)
10. “International Workshop on Development of Animal Models For Metabolic Disease” organized by OIC-COMSTECH, Islamabad, Pakistan. (2023)
11. Hands-on Workshop on Machine Learning “The Future of Biology” organized by Dense Fusion (School of Interdisciplinary Engineering & Sciences, SINES), National University of Sciences and Technology (NUST), Islamabad, Pakistan. (2023)
12. “International Brain and Biomedicines Conference (IBBC-2023)” organized by Government College University (GCU), Faisalabad, Pakistan. (2023)
13. International conference/workshop “Science Communication and Community Engagement”, organized by COMSTECH and Ministry of Foreign Affairs in collaboration with Technology Times, Regional Rapport, and Pakistan Biotechnology Information Center (PABIC), Islamabad, Pakistan. (2023)
14. International seminar on “Herbal and Traditional Medicine: A Sustainable Alternative for the Greener Future” organized by OIC-COMSTECH, Islamabad, Pakistan. (2022)
15. One day workshop on “Recent Health Security and Public Health Threats” organized by Department of Bioinformatics and Biosciences, Capital University of Sciences and Technology, Islamabad, Pakistan. (2022)
16. A scientific seminar on “Bioscience in Biosciences; A Journey So Far” organized by BS Biochemistry 8<sup>th</sup> semester, Department of Biochemistry, Bahauddin Zakariya University, Multan, Pakistan. (2022)
17. An online “Workshop on Effective E-Learning”, a project supported by global UGRAD-Pakistan and IREX and funded by United States. (2022)
18. 1<sup>st</sup> International Conference on Water, Energy and Environment for Sustainability (IC-WEES) “Biotechnologies for Health, Environment and Agriculture” organized by ASAB, NUST, Islamabad, Pakistan. (2022)

Pakistan. (2021)

19. A webinar “Web of Science and JCR Webinar” organized via Cisco Webex. (2021)
20. “International Symposium on Global Biodiversity and Health Big Data” organized by NCB, Quaid e Azam University (QAU), at OIC-Ministerial Standing Committee on Scientific and Technological Cooperation (COMSTECH) Islamabad, Pakistan. (2019)
21. “2<sup>nd</sup> Future Leaders Conference Pakistan” organized by Chief Minister Youth Mobilization Committee at Bahauddin Zakariya University (BZU), Multan, Pakistan. (2018)
22. “Awareness Seminar on World Polio Day” organized by Rotaract Club BZU Multan at Institute of Pure & Applied Biology, BZU, Multan, Pakistan. (2017)

## SKILLS

- **Graphic Design:** Logo design, infographics, social media graphics; Adobe Illustrator, Canva Pro, PowerPoint.
- **Photography:** Landscape and portrait photography; Adobe Lightroom and Photoshop editing.
- **Digital Marketing:** Social media content creation, engagement, and strategy.
- **Soft Skills:** Communication, project management, attention to detail.

## EXTRA-CURRICULAR ACTIVITIES

1. Reviewer for Frontiers in Bioinformatics, Frontiers. (2025)
2. Reviewer for current Research in Biotechnology, Elsevier. (2025)
3. Reviewer for Journal of Molecular Recognition, Wiley. (2025)
4. Reviewer for Biochemical and Biophysical Research Communications, Elsevier. (2025)
5. The student body team lead for Graphic Designing, Printing, and Social Media Teams for the International Conference on Integrative Life Sciences (ICiLS 2024) organized by ASAB, NUST. Designed all the conference-related materials, including the ASAB logo, banners, books, certificates, and social media posts using Adobe Illustrator and Canva Pro. (2024)
6. Actively participated in Annual Sports Gala 2023 held at Atta-ur-Rahman School of Applied Biosciences (ASAB), National University of Sciences and Technology (NUST), Islamabad. (2023)
7. Team member of graphic designing team for IC-WEES (2021), organized by ASAB, NUST.
8. Participated in different cleanliness events and hikes organized by NUST Environment Club (NEC). (2019-20)
9. 2<sup>nd</sup> prize in photography competitions by NUST Digital Club (NDC) and Canon. (2019)

## REFERENCES

### 1) Dr. Amjad Ali

Professor (Tenured)

PI of Integrative Biology Lab / Microbial- Genomics & Bioinformatics (MGB) Research Group & CEO of MGBIO (SMC) Ltd (<http://www.mgbioinfo.com/>)

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### 2) Dr. Yasir Waheed

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### 3) Dr. Sara Ishaq

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