Potential Project Areas in the PhD Programme "Epidemiology"

1. **Information Technology in Surveillance and Outbreak Management**
   a. Possible methods: systematic surveillance system evaluations, epidemiologic modeling, statistical algorithms, geographic information system
   b. Priority pathogens: pathogens with antimicrobial resistance, vaccine preventable diseases, respiratory pathogens, gastro enteric bacterial infections, other high priority epidemic prone diseases in Africa
   c. Preferred geographic focus: primarily Nigeria and Ghana; possibly also Africa, Latin America, Asia
   d. Suggested link to ongoing and previous research: www.sormas.org
   e. Language requirements: English (fluent), German (fair)

2. **Prevalence and Determinants of Infections; Effectiveness of Health Interventions**
   a. Possible methods: (Sero-) epidemiologic surveys, systematic reviews and/or synthesis of available (surveillance) or other data, e.g. those obtained from screening records
   b. Priority pathogens: infections in general, especially Hepatitis or vaccine-preventable infections
   c. Preferred geographic focus: all countries
   d. Suggested links to ongoing and previous research:
      https://www.ncbi.nlm.nih.gov/pubmed/30268515
      https://www.ncbi.nlm.nih.gov/pubmed/27592304
      https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4743086/
   e. Language requirements: English (fluent), German (fair)

3. **Infections as Precursor, Risk Factor or Cause of Non-communicable Diseases and Risk Factors/ Predictors for Infections**
   a. Possible methods: Analysis of research data already collected including machine learning, time series analysis, text mining, user experience research, namely those generated by the German National Cohort or ZIFCO systematic/scoping reviews
   b. Priority pathogens/outcomes: e.g. respiratory pathogens, parodontal disease, metabolic and cardiovascular disease, neurological disease and others.
   c. Preferred geographic focus: Germany, (Europe)
   d. Suggested links to ongoing and previous research:
      www.helmholtz-hzi.de/zifco; www.info-pia.de; https://nako.de/informationen-auf-englisch/;
   e. Language requirements: German (fluent), English (fluent)

4. **Effects of Vaccination on Non-specific Morbidity (e.g. Non-communicable Diseases)**
   a. Possible methods: Analysis of data from German National Cohort, systematic reviews
   b. Priority pathogens/outcomes: any
   c. Preferred geographic focus: Germany, (Europe)
   d. Suggested links to ongoing and previous research:
      https://nako.de/informationen-auf-englisch/;
   e. Language requirements: German (fluent), English (fluent)

5. **Control of Nosocomial Infections**
   a. Possible methods: medical informatics, data science, machine learning, epidemiologic modeling, time series analysis, text mining, user research, big data analytics
   b. Priority pathogens: any
   c. Preferred geographic focus: Europe
   d. Suggested link to ongoing and previous research: www.highmed.org/about/use-cases/infection-control
   e. Language requirements: German (fair, reading), English (fluent)

6. **Novel Tools for (Self-) Sampling in Epidemiological Studies**
    a. Possible methods: handling pathogenic microorganisms, biophysical and molecular methods, focus on device design, data analysis
    b. Priority pathogens: respiratory pathogens, e.g. Influenza H3N2, *Pseudomonas aeruginosa*, *M. bovis* BCG; hepatitis viruses
    c. Preferred geographic focus: does not apply
    d. Suggested link to ongoing and previous research:
        https://www.helmholtz-hzi.de/en/research/research_topics/bacterial_and_viral_pathogens/epidemiology/epidemiological_lab/,
        https://www.helmholtz-hzi.de/en/research/research_projects/view/projekt/detail/-4a0c66b596/
        https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4210747/
        https://www.ncbi.nlm.nih.gov/pubmed/24813875
    e. Language requirements: German (fluent) or English (fluent)

7. **Differential Multiplex Serology**
    a. Possible methods: handling contaminated material from patients, molecular methods like cloning, heterologous protein expression, high throughput bead-based multiplex serology, biomarker-oriented research, data analysis
    b. Priority pathogens: respiratory and chronic pathogens, vaccine-preventable diseases (e.g. measles, hepatitis viruses) and emerging pathogens
    c. Preferred geographic focus: n. a.
    d. Suggested links to ongoing and previous research:
        https://www.helmholtz-hzi.de/en/research/research_topics/bacterial_and_viral_pathogens/epidemiology/epidemiological_lab/,
        https://www.helmholtz-hzi.de/en/research/research_projects/view/projekt/detail/-9dc57fffd7/
        https://www.ncbi.nlm.nih.gov/pubmed/28919226
        https://www.ncbi.nlm.nih.gov/pubmed/29855458
    e. Language requirements: German (fluent) or English (fluent)

8. **Infections of the Immunocompromised Host**
    a. Possible methods: evaluation of data quality, data mining and data cleaning, research communication (reporting and visualization), machine learning, longitudinal study designs
    b. Priority pathogens: any bacterial, viral, fungal or parasite infection (postoperative)
    c. Preferred geographic focus: Europe
    d. Suggested link to ongoing and previous research:
        www.dzif.de/en/research/infections_of_the_immunocompromised_host/transplantationskohorte_e_v/
    e. Language requirements: German (fluent), English (fluent)