



# PhD in DATA ANALYTICS AND DECISION SCIENCES - 39th cycle

## THEMATIC Research Field: DATA ANALYTICS FOR ELECTRONIC HEALTH RECORD LINKAGES

### Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

### Context of the research activity

#### Motivation and objectives of the research in this field

This project aims to create in-silico cohorts of mothers and offspring from population-representative, longitudinal, routinely collected, linked health data (electronic health records), and to use these to answer emerging research questions in maternal and child health. To this scope, the student will have access to both national datasets (in particular from Regione Lombardia and Veneto) and international datasets (UK, Finland), the latter requiring extended research visits abroad to collaborating Research Centres. This project will build legacy resources that will advance research and knowledge production on all aspects of pregnancy/perinatal/maternal/child health requiring linked data from mothers and offspring in an intergenerational framework, including but not limited to pharmacoepidemiological surveillance of drugs safety in pregnancy. These resources currently do not exist for many countries, including Italy and England. The combination of advanced analytical methods, robust and powerful datasets, and impactful research questions make this a flagship project for the whole Health Data Science Centre at Human Technopole.

#### Methods and techniques that will be developed and used to carry out the research

The research will consist of an initial phase of exploring and optimising different methods for probabilistic record linkage to link maternal and offspring health records. These will include both established and novel data linkage methods, including both statistical and machine learning models, followed by exploration of data linkage errors and



	<p>models, followed by exploration of data linkage errors and their minimisation- in an iterative approach. As a second phase, the student will conduct a rigorous validation using deterministic data linkage (using linkage keys such as unique identifiers) as gold standards. In the third and final phase of the project, the student will conduct translational research by applying the optimised linkage processes to interrogate the longitudinal mother-baby cohorts and gain insights into intergenerational effects between maternal and offspring health. This will be done through the application of state-of-the-art statistical models that improve causal inference such as trial emulation and propensity score matching.</p>
<b>Educational objectives</b>	<p>The successful candidate will collect, analyse and manage healthcare data available in the projects developed in the joint Centre for Health Data Science of Human Technopole and international collaborating Research Centres. Moreover, the candidate will support the definition of potential and limitations of the data as well as develop knowledge and evidences from the real worlds data, through the use of advanced data analytics techniques including causal inference approaches.</p>
<b>Job opportunities</b>	<p>The profile of data scientist and the applications proposed in this project are of interest to of a broad range of actors, including (but not limited to): public and private institutions dealing with healthcare, hospitals, clinical and pharmaceutical companies, public health charities, policymakers, as well as international institutions and research centers working in health and healthcare research.</p>
<b>Composition of the research group</b>	<p>1 Full Professors 1 Associated Professors 6 Assistant Professors 2 PhD Students</p>
<b>Name of the research directors</b>	<p>Dr Luisa Zuccolo and Prof. P. Lanzi</p>

<b>Contacts</b>	
<p>Dr. Luisa Zuccolo luisa.zuccolo@fht.org +393384960985</p>	



Zuccolo Group - Human Technopole

Prof. Pierluca Lanzi  
 pierluca.lanzi@polimi.it  
 +390223993472  
 DEIB - Politecnico di Milano

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	12

**Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

List of Universities, Companies, and Institutions cooperating in the research:

- Fondazione Human Technopole (Italy)
- University of Bristol (UK)
- University of Cambridge (UK)
- FinRegistry - Finnish Institute for Health and Welfare (Finland)

Further support is available for students who engage in activities of teaching or additional lab duties coherent with their academic mission and doctoral training. The PhD student is encouraged to take part in these activities within limits allowed by the regulations.