PhD research activity

1st Annual progress report

Name	Lazzarato Fulvio
PhD cycle	XXIX (start date: 14 February 2014)
PhD course	Medical Sciences And Biotechnology
Locations	Department of Health Sciences and Department of Translational Medicine (Novara - Italy)
Supervisor	Prof. Fabrizio Faggiano
External Supervisors	Dr. Silvia Franceschi, Dr. Iacopo Baussano

Aims

Develop an ad-hoc software suite that dynamically simulates the potential impact public health measures aiming at reducing the burden of chronic diseases in the population. The present project will be developed from the perspective of two study cases: a) primary and secondary prevention of cervical cancer consequent to carcinogenic Human Papilloma Virus (HPV) infection, and b) implementation of tobacco control measures. The models developed for the present project will be based on high-performance programming, i.e. programmed using “low level” computing languages (e.g. C/C++), efficient data structures and algorithms, and advanced statistical methods/libraries (e.g. GNU Scientific Library [*GSL]*) and software (e.g. R).

Activity description

During my first PhD year I adapted and expanded the available HPV population based models to account new features. Here's a list of most relevant changes in the model: a) New screening programme for Hpv positive girls related four axis: calendar time, girls age, time since Hpv and CSA (Class of Sexual Activity). b) New dump behaviour that allow multiple restart with multi-threads approach. c) Assortativeness and mixing matrix with a new dimensional axis in order to handle change in sexual partnership and/or different proportion of CSA status related to calendar time.

With these new features I run many simulation related Swedish country (Collaboration with Karolinska Institutet, Department of Medical Epidemiology and Biostatistics). These simulations covered different vaccination scenario for women, man and both of them with different coverage. We started to prepare the first draft of articles related these points: a) Vaccination scenarios for Sweden, b) Impact of vaccination by Cohort, and c) Temporary vaccination coverage reduction. Another set of simulation was created and run in order to fit data for Guanacaste province, this is a collaboration with IARC Prevention and Implementation Group that provide us data from a survey about sexual and reproductive practices in Costa Rica. In order to have robust estimation of new partner rates, we plan to run again other simulations when best data will be available. During my research activity I also expanded the Iarc web project "Assessment of early impact of HPV vaccine and screening: an integrated approach to cervical cancer prevention" in order to include other survey (e.g. Bhutan Cells and Urine Follow-Up). Data collected with this project will help us to calibrate our model. Finally, I developed a new model related carcinogenic aspect of cervical cancer that works in pipeline with an adapted HPV infection model. Related tobacco control measures side, we defined our model and how to use available data. We chose an agent based model with a probabilistic and partner's network.

Attended courses

- 16/06/2014 - 20/06/2014 Lyon (FR)
  IARC Summer School, Module 1 - Cancer Registration: Principles & Methods
- 23/06/2014 - 04/07/2014 Lyon (FR)
  IARC Summer School, Module 2 - Introduction to Cancer Epidemiology

Attended seminars

- 01/04/2014; IARC Lyon; Dr Jukka Takala; Elimination of Occupational Cancer An International Collaboration
- 02/04/2014; IARC Lyon; Pr Vladimir N.Anisimov; Circadian desynchronosis induced by light-at-night: The role in cancer and aging
- 08/04/2014; IARC Lyon; Dr Salvatore Vaccarella; Global trends of cervical cancer incidence: impact of screening versus changing exposure to risk factors
- 09/04/2014; IARC Lyon; Dr Rodolfo Saracci; What is a conflict of interest?
- 11/04/2014; IARC Lyon; ECSA Scientific Day; 7 presentations given by ECSA (Early Career Scientists Association) members
- 29/04/2014; IARC Lyon; Dr Rengaswamy Sankaranarayanan; What can we do to control breast cancer in low- and middle-income countries?
- 23/05/2014; UNIPMN Novara; Dr Francesco Barone-Adesi; Methods for the analysis of the exposure-time-response relationship in epidemiology
- 27/05/2014; IARC Lyon; Dr Isabel Dos Santos Silva; Breast cancer control: one size does not fit all
- 27/05/2014; IARC Lyon; Pr David Wishart; Mining metabolites for medically meaningful markers
- 28/05/2014; IARC Lyon; Mr Rémi Béranger; The use of Geographic Information Systems for pesticide exposure assessment

- 07/10/2014; IARC Lyon; Dr Groesbeck Parham; Creative disruption of the “no screening” status quo for cervical cancer in Zambia
- 10/10/2014; IARC Lyon; Dr Partha Basu; Harnessing the Power of Cancer Prevention and Early Detection
- 17/10/2014; CPO Torino; Prof. Benedetto Terracini; Occupational cancers in developing countries

Attended meeting/workshop

- 25/02/2014: Torino, Palazzo della regione; Workshop Finale Programma CCM 2011: Diario della Salute. Percorsi di promozione del benessere tra i pre-adolescenti. Risultati e considerazioni conclusive. Organizzato da Regione Piemonte, ASL CN2 Alba-Bra, CCM – Ministero della Salute
- 05/03/2014: Lyon (FR), IARC; Round table about Hpv modelling activities with Dr Marc Brisson (Département de médecine sociale et préventive, Laval University, Canada)
- 11/09/2014: Torino, A.O.U. Città della Salute e della Scienza di Torino; WHO International meeting: Early Detection and Screening Programmes in the Mediterranean Countries

Pubblication with affiliation: Department of Translational Medicine, University of Piemonte Orientale Avogadro, Novara, Italy

Beccuti M, Carrara M, Cordero F, **Lazzarato F**, Donatelli S, Nadalin F, Policriti A and Calogero RA; “Chimera: a Bioconductor package for secondary analysis of fusion products" Bioinformatics. 2014 Oct 6. [Epub ahead of print] PMID:25286921

Torino, 22 October 2014

Lazzarato Fulvio