Though we have a wealth of studies on environmental pollutants, the assessment of causality is often difficult because of confounding, reverse causation, and other uncertainties. Biomarkers and omic technologies may allow better causal attribution, for example using instrumental variables in triangulation. Even more complex is the understanding of how social relationships (in particular socio-economic differences) influence health and imprint on the fundamental biology of the individual. The identification of molecular changes that are intermediate between social determinants and disease status is a way to fill the gap. Another field in which biomarkers and omics are relevant is the study of mixtures. Epidemiology often deals with complex mixtures (e.g., ambient air pollution, food, smoking) without fully disentangling the compositional complexity of the mixture, or with rudimentary approaches to understanding the overall effect of multiple exposures or components. From the point of view of disease mechanisms, most models hypothesize that several stages need to be transitioned through health to the induction of disease, but very little is known about the characteristics and temporal sequence of such stages. To address these problems, we need the establishment of a new generation of cohort studies with appropriately specified biomarker discovery, improved questionnaire data (including social variables), and the deployment of novel technologies that allow better characterization of individual environmental exposures, ranging from personal monitoring to satellite based observations.

Agriculture intensification of smallholder farming systems is accompanied by the increasing use of pesticides and fertilizers. However, there are environmental and public health concerns, for example, due to the poor knowledge, attitudes, and practices of pesticide handling of smallholder farmers, particularly in low- and middle-income countries.

This presentation aims to provide insights from our inter-disciplinary research projects with Ugandan organic and conventional smallholder farmers over the past 7 years. We will highlight the lessons learned from observational longitudinal studies on pesticide use and their related human and environmental exposure and health risks. Also, we will showcase the opportunities that arose when moving towards intervention-oriented study designs to reduce pesticide exposure with face-to-face training and SMS-based interventions.

Work-related musculoskeletal disorders (WRMSD) are the commonest occupational health conditions and impact medical costs, work productivity, work disability, and absenteeism. Occupational physicians and company doctors must conduct health surveillance programmes to prevent WRMSDs in individual workers and working populations. This includes preventative medical examinations to screen for conditions incompatible with the job the worker has been assigned and periodic medical examinations to monitor the worker’s health regularly. The Nordic Questionnaire is the most widely used tool, describing WRMSDs that have occurred in the previous 12 months, but it does not include a severity threshold. Existing tools rarely indicate significant differences in WRMSDs between exposed and unexposed workers creating limitations in interpreting the risk-damage relation. Periodic health surveillance for WRMSD is organised on three levels – level 1: programmes address all exposed workers and pick up “anamnestic cases”; level 2: clinical examination of workers who test positive in the anamnestic examination; level 3: instrumental exams (X-rays, ultrasonography, electromyography, etc.) to determine diagnoses. This presentation will discuss the principles of health surveillance programmes for WRMSDs, the limitations of the conventional approaches, and the new software-based Latin Questionnaire (LQ) to be used in the first level of health surveillance. LQ offers a global anamnestic investigation of WRMSD, with a filtering tool (severity threshold) for deciding which workers require the subsequent steps in the health surveillance process (clinical and instrumental testing). LQ is a preliminary epidemiological investigation tool for recording the initial collective impact (already in the anamnestic phase) on the health of workers exposed to occupational biomechanical overload versus unexposed workers. LQ classifies the workers analysed as “positive anamnestic cases”, “minor disorder cases”, or definitively “negative cases”. The LQ software can help conduct preliminary epidemiological studies, processing the collective results of health surveillance activities, at first, purely anamnestic level.