



Project Description for ARASIA TC Programme

TC Cycle 2020-2021

Project Number: RAS6094

Project Title: Applying Nuclear Techniques for the Determination of Body Fat and Anthropometric Cutoffs (ARASIA).

Overall Objective: To develop preventive strategies aimed at curbing the burden of non-communicable diseases (NCDs) in the ARASIA region.

Project Duration: (2020 – 2023)

Project Description: The prevalence of adolescent overweight and obesity in countries of the Cooperative Agreement for Arab States in Asia for Research, Development and Training related to Nuclear Science and Technology (ARASIA) region is amongst the highest in the world. Overweight and obesity in adolescents are associated with several cardiometabolic abnormalities, including atherogenic dyslipidemia, hyperglycemia and elevated blood pressure, the constellation of which is referred to as the metabolic syndrome (MetS). Building on the use of stable isotope techniques, this project aims to (1) determine the optimal cutoff values for body fat; body mass index (BMI) z score; and waist circumference (WC) for the prediction of MetS amongst adolescents in countries of the ARASIA region; and (2) develop regional recommendations for the assessment of adiposity to be shared with policy makers and health care practitioners in countries of the region. Acknowledging that excess body fat rather than excess body mass is related to increased disease risk, this project responds to the need for the identification of body fat cutoff values in adolescents and hence, addresses an important knowledge gap in the literature. In addition, this project responds to the need for ethnic-specific anthropometric cutoffs for the identification of excess adiposity and associated cardiometabolic risks in the adolescent population of the ARASIA region. The adoption of the generated population-specific cutoffs may assist policy makers, public health professionals and clinical practitioners in providing ethnic-specific preventive and curative strategies tailored to adolescents in the region. Future studies may examine the validity of the generated cut-offs in other countries of the region.

Problem to be addressed: Non-communicable diseases (NCDs), including diabetes, cardiovascular diseases and cancer are the main cause of death in the ARASIA region, explaining more than 70% of mortality. The escalating prevalence of overweight and obesity is recognized as a major risk factor for cardiometabolic abnormalities and several NCDs in countries of the region, which are currently undergoing the nutrition transition. More specifically, the region currently harbours one of the highest burdens of adolescent obesity worldwide. In fact, adolescents represent the age group that suffers the most from the adoption of a western lifestyle characterized by long hours of television viewing,



computer games and heavy reliance on fast food, all of which are key factors affecting nutritional habits and obesity levels. Proper identification and diagnosis of adolescent overweight and obesity is therefore crucial for early management and prevention. The assessment of adiposity in this age group is usually based on anthropometric indices, the most common being the BMI z score and waist circumference percentile. However, these cutoffs do not distinguish between increased mass in the form of fat, lean tissue or bone, and hence may result in significant misclassification. Since the pathology and morbidity associated with overweight and obesity is driven by excess fat mass, the ideal assessment tool should directly assess adiposity. In addition, the interpretation of BMI z score and WC is based on international cutoffs, such as the ones developed by the World Health Organization (WHO). However, these cutoffs were mainly derived from data pertinent to western populations, and an increasing body of evidence suggests that ethnic disparities in body composition and body fat distribution patterns may limit the applicability of these cutoffs to other ethnicities. Using anthropometric cutoff values that are not population-specific might lead to misclassification of weight status and could reduce the sensitivity and specificity of these indices in the diagnosis of overweight and obesity, hence jeopardizing prevention, early identification and management of metabolic abnormalities. Hence the WHO has recommended the development and use of population-specific anthropometric cutoff values. In countries of the ARASIA region, evidence regarding the link between body fat and cardiometabolic risk and the validity of various anthropometric cutoffs in identifying adolescent overweight and obesity is lacking. This project will contribute to this evidence gap, generating knowledge related to body fat and anthropometric cutoffs, which will improve the diagnosis of excess adiposity in this age group, and contribute to better prevention and management strategies.

This project is proposed as a regional activity for the following reason(s): The proposed project tackles a public health priority that is common to all countries of the ARASIA region. These countries are witnessing the nutrition transition characterized by shifts in dietary and lifestyle habits and concomitant changes in body composition. One of the most vulnerable population groups to the ongoing nutrition transition includes the adolescent age group that is suffering from a high burden of overweight and obesity, putting them at increased risk for NCDs and increasing the associated health care cost in countries of the region. Acknowledging that adolescents represent approximately 18% of the population of the region, this highlights the need for developing population-specific strategies aimed at improving the diagnosis of excess adiposity and developing tailored prevention and management interventions. The available anthropometric cutoffs for the diagnosis of overweight and obesity in adolescents are derived from western populations and hence, may not be applicable to populations of the ARASIA region. This project provides a unique opportunity to examine the body composition of adolescents in various countries of the region and develop ethnic-specific cutoffs that may be adopted by Member States. The project will also be a platform for sharing knowledge among ARASIA Member States, fostering the optimal use of available resources.



Stakeholders: Where appropriate, stakeholders will include (1) ministries of health (Lebanon, Jordan, Syria, Iraq, and in other participating countries); (2) the Dubai Health Authority; (3) research institutes; (4) ministries of education; (5) local atomic energy authorities; (6) ministries of planning; and (7) the WHO Regional Office for the Eastern Mediterranean (WHO EMRO).

Partnerships: Where appropriate, partnerships will be established with (1) ministries of health (Lebanon, Jordan, Syria, Iraq, and in other participating countries); (2) the Dubai Health Authority; (3) ministries of education; (4) local atomic energy authorities; and (5) universities.

Role of nuclear technology: The deuterium dilution method is an accurate and valid method for the assessment of body composition. Building on this isotopic technique, this project will allow for the generation of body fat cutoff values associated with increased cardiometabolic risks, and the validation of anthropometric cutoff values specific to the adolescent age group. The project will therefore contribute to strengthening the national and regional infrastructure for the application of isotopic and complementary techniques in body composition assessment in order to develop preventive measures and national protocols aimed at controlling overweight and obesity, and the associated burden of chronic non-communicable diseases. There were no previous regional efforts in this area; this is the first regional project ARASIA submits in the field of nutrition and IAEA guidance and inputs are highly needed.