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Mapping UNSW Impact
Global Development

Primary SDG	**2: ZERO HUNGER**
Broad theme	Children's nutrition
Research	Designing an app that better measures a child's nutritional level than the current arm measurement method
Impact region	Global
Faculty	Engineering
School/Institute	Biomedical Engineering
Academic	Heba Khamis
Project partners	Bill and Melinda Gates Foundation (previous) – funding of USD 100,000
Related SDGs	1: No Poverty

Elevator pitch

Heba is working on a smartphone app that could potentially perform a better assessment of a child's nutrition compared to the current basic method, helping children avoid chronic and acute illness and providing a more accurate picture of the number of children in need of medical attention.

The Challenge: Malnutrition among children remains a major challenge

According to the World Health Organisation (WHO), there are 151 million children globally with malnutrition issues. This includes 22% of all children under 5 years of age whose growth is stunted, 16 million children who are severely 'wasted', and 38 million children who are overweight. Malnourished children are at high risk of experiencing chronic and acute health issues in their lives.

In developing countries, the current technique to assess a child's nutrition is to measure the circumference of their arm and compare this number with statistical thresholds. This basic measurement could easily be misdiagnosing and misestimating the number of children who are malnourished and need assistance. A more accurate method, where more measurements are taken as they are in the developed world, is needed. Smart phones are prevalent throughout the developing world and could help with more advanced measurement.

UNSW's solution: Develop an app that better measures a child's nutritional level

In 2015, Heba saw that the Bill and Melinda Gates Foundation was seeking applications for the target challenge of pneumonia. Heba recognised that kids who are malnourished and contract pneumonia are nine times more likely to die and that the existing basic method for assessing nutrition could be overlooking children. She applied and received USD 100,000 in funding to investigate the potential for a smartphone app to perform the assessment. The app would do this by having a family member or clinician take two photos of the child. The app would then extract and measure the child's silhouette on a range of indicators and deliver a final nutrition result. In the case of a malnutrition result, the app would recommend the child seeks expert attention. The Gates Foundation funding was for 'proof of concept' around the ability to extract this information from two photos taken by a phone.

Heba encountered two key challenges. Firstly, the two photos (one front on, one side on) must be taken according to a number of rules: straight on, at the child's eye level, preferably against a plain background. The app could be built so that instructions would be provided to the photo taker, preferably a parent or clinician. Secondly, the extraction of the child's silhouette requires the image to be processed (using coding) with pixels relating to real world measurements. The photo subject should ideally stand next to something of universal size (a checkerboard, a credit card, or coke can, for example), so that the pixel measurements of the child can be accurately converted to real world measurements. Heba has four undergraduate students working on this challenge. With further funding, she would continue to develop algorithms and she would visit an indigenous community in Australia or a remote community in Indonesia to test the algorithms against the basic (physical) arm method to see if results are valuable.

The Impact: Identify more malnourished children, promote food and policy responses

Should the app and its algorithms produce more accurate results than the current physical method, Heba's idea could provide a more accurate picture of kids in need. This will help more children get the help they need and minimise their risk of experiencing chronic and acute health conditions. Results would be shared with NGOs and governments to raise awareness, influence policy and encourage feeding programs. Heba's ultimate aim is for her app to become the WHO standard for measuring a child's nutritional level (the WHO already has an app to monitor a child's growth development) and for it to be freely available in the developing world.

Researcher

Dr Heba Khamis is a Lecturer at the Graduate School of Biomedical Engineering at UNSW. She completed her PhD in developing methods for epileptic seizure detection from EEG at the University of Sydney in 2011. After working as an external Lecturer at the University of Sydney and an appointment as a Postdoctoral Research Fellow at the University of Western Sydney (UWS) and Neuroscience Research Australia (NeuRA), she was appointed as an Associate Lecturer at the Graduate School of Biomedical Engineering, UNSW in 2014. Her primary research interests revolve around the application of signal processing and pattern recognition techniques to solve and understand biomedical engineering problems.

Ben Falkenmire 06.08.18