# A low-cost solar-powered blood-pressure device

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It is almost mandatory to label increased blood pressure as a readily detectable and, importantly, preventable contributor to the global epidemic of cardiovascular disease.[1] But there is often little appreciation of the barriers to providing even rudimentary health care in low-to-middle-income countries.[2] A rising tide of hypertension linked to epidemiological transition in vulnerable urban communities, such as Soweto, South Africa,[3] has been challenging when access to simple, reliable, and accurate devices to measure blood pressure—commonly enjoyed by clinicians in high-income countries—remains scarce.

In response, WHO commissioned the development of a manual/automated, non-mercury, solar-powered, accurate, and robust device for low-resource settings. Omron was the only manufacturer to produce a device that met the technical specifications (albeit at a greater cost than first stipulated). The Omron HEM-SOLAR is battery-powered and records brachial blood pressure oscillometrically, in the range of 0–299 mm Hg and heart rate of 40–180 beats per minute. Inflation can be manual by pumping the inflation bulb to save battery power. After solar charge at 23°C and 65% room humidity, the battery is capable of 300 inflations. The device can also be powered by rechargeable batteries. The wholesale price is €25.

Gianfraco Parati and colleagues[4] have validated the device in two hospitals in Uganda and one in Zambia, according to the International Protocol of the European Society of Hypertension. A five-point Likert scale was used to assess ease of use, patient's preference, accuracy, durability, comfort, and clarity of measurement display. The HEM-SOLAR was favoured over the mercury sphygmomanometer by both patients and investigators. Therefore the authors concluded that this device will probably be useful for improving blood pressure measurements in low-resource settings with non-physician health workers.

Will this humble device become key in turning the tide against the epidemic of cardiovascular disease in low-income and middle-income countries? Any response to diseases of lifestyle that commonly afflict the poorest and most vulnerable people in predominantly urban regions of low-to-middle-income countries in epidemiological transition[5] requires pragmatic responses that move beyond the blame game of life-style choice,[6] and focus on equipping resource-poor health-care systems to readily identify and treat at-risk individuals. The population-attributable risk of hypertension for stroke and hypertensive heart disease in the most productive members of society in such countries (ie, middle-aged individuals in the workforce) is undoubtedly substantial.[1]

The HEM-SOLAR does not need observers to be trained in the auscultatory technique, and will permit nurses and community workers (the backbone of health care in many low-to-middle-income countries) to optimally diagnose and manage hypertension.[7] However, a single device will not change the landscape of primary and secondary prevention of cardiovascular disease in these countries. A multifaceted approach is needed, with similarly pragmatic public health strategies that use low-cost but reliable technologies.[2] For example, the reintroduction of compulsory school sports, taxation of soft drinks and high-energy fast foods, reduction of salt intake, and a ban on smoking (at least in public places) are equally important to prevent metabolic disorders (ie, obesity-related type 2 diabetes) that are closely linked to hypertension. The politics of global health needs to be reframed; in particular, the transition to diets that are high in saturated fat and sugar needs to be addressed on a global scale.[8] The Heart of Soweto study showed that obesity was the most common contributor to hypertensive heart disease, especially

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in young women moving from rural to urban areas.[5] With profound socioeconomic forces in play, therefore, the preventable pathways to cardiovascular disease are often more complex than the inability to reliably measure blood pressure.

Despite such complexities, WHO's initiative to support the development of a simple, affordable, solar-powered device should be lauded. Hopefully, other cheaper devices (eg, for cardiac ultrasound) will be developed to detect other important conditions, including rheumatic heart disease and pericarditis.[9] But a market for such devices (with competition between manufacturers to drive prices down) needs to arise in low-to-middle-income countries. Ultimately, a sustainable platform of research funds is needed to tackle an increasing burden of non-communicable cardiovascular diseases in these countries, via multifaceted prevention programmes (with devices such as the HEM-SOLAR) to reliably detect at-risk individuals and monitor the effect of combined pharmacological and non-pharmacological interventions.

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