

App detecting jaundice may prevent deaths in newborns

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The screening method is currently being trialled in a large-scale feasibility study at Greater Accra Regional Hospital. Credit: Dr Christabel Enweronu-Laryea, University of Ghana.

A smartphone app that allows users to check for jaundice in newborn babies simply by taking a picture of the eye may be an effective, low-cost way to screen for the condition, according to a pilot study led by UCL and UCLH.

Jaundice, where the skin and whites of the eyes turn yellow, causes 114,000 [newborn deaths](#) and 178,000 cases of disability a year worldwide, despite being a treatable condition. Three quarters of deaths are in south Asia and sub-Saharan Africa.

The study, published in *PLOS ONE*, found that a new screening method quantifying the yellowness of the eye—which used images captured on a smartphone camera—can be as effective at detecting more severe jaundice as costly screening devices recommended for use in the UK.

Dr. Terence Leung (UCL Medical Physics & Biomedical Engineering), senior author of the paper, said: "In many parts of the world, midwives and nurses rely on sight alone to assess jaundice. However, this is unreliable, especially for newborns with darker skin.

"Our smartphone-based method provides a more robust assessment, ensuring serious cases do not go unnoticed. While we await the evidence of a larger trial, we believe that this method, used as an app, could help to prevent the deaths of newborn babies due to severe jaundice worldwide."

Jaundice is caused by a yellow substance called bilirubin accumulating in

the body. While most cases in newborns are harmless, in severe cases a neurotoxic form of bilirubin can enter the brain, leading to death or disabilities such as hearing loss, neurological conditions such as athetoid cerebral palsy, and developmental delays.

In hospitals, newborns suspected of being at risk can be given a blood test to determine the concentration of bilirubin in the blood. However, jaundice may only become problematic several days after birth, when mother and newborn are at home.

In the study, smartphone pictures were taken of the eyes of 37 newborn babies at UCLH who had been referred for blood tests. These images were processed to remove the distorting effects of background light and the yellowness of the eye quantified to predict the level of bilirubin in the blood.

These predictions were then compared to the results of the blood tests. The method successfully identified all cases where treatment would normally be required, while identifying cases that would not require treatment 60% of the time. This is a [success rate](#) comparable to transcutaneous bilirubinometers—expensive hand-held devices recommended for use by midwives in the UK.

First author, Felix Outlaw (UCL Medical Physics & Biomedical Engineering), said: "Our screening method would require no special equipment apart from a smartphone and is a tenth of the cost of commercial devices used in the UK.

"Given that smartphones are common even in poor and remote parts of the world, being able to use them to screen for [jaundice](#) would have a significant impact."

A larger trial of the screening method involving more than 500 babies is

now underway in Ghana. The trial, a collaboration between UCL and the University of Ghana as well as Greater Accra Regional Hospital, is funded by the "Saving Lives at Birth" award, with funders including the United States Agency for International Development (USAID), the government of Norway, the Bill & Melinda Gates Foundation, Grand Challenges Canada, the UK government, and the Korea International Cooperation Agency (KOICA).

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