

Towards a global spectroscopic platform for medicine quality screening: the NIR4MED project.

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The detection of substandard and falsified medicines using screening devices is an essential cornerstone of the WHO "Prevent/Detect/Respond" strategy. Among the available screening technologies, handheld near-infrared (NIR) spectrometers are the most promising: they are affordable, easy to operate, versatile, and non-destructive. Their widespread deployment is nevertheless hindered by two obstacles: (i) field users must build their own reference spectral databases and chemometric models, and (ii) spectra acquired on different devices are not directly comparable.

The NIR4MED project aims to develop an open, globally accessible analysis platform allowing field users to compare their spectra against a curated reference database based on spectra acquired on benchtop instrument through validated algorithms. These include qualitative and quantitative models for active ingredient identification and quantitation. Calibration transfer algorithms ensure that models built on a master benchtop instrument remain valid on field portable devices. The project also delivers standard operating procedures for sample metadata collection, field analysis and equipment qualification, together with the operational tools supporting instrument qualification and longitudinal performance monitoring. The platform is designed as an integrated web-based service covering sample registration, spectral analysis and report generation.

Funded by Fondation Pierre Fabre, the project brings together three universities (University of Abomey-Calavi (Benin), University of Toulouse (France) and University of Liège (Belgium)) and runs for 36 months until September 2028. It focuses on four essential medicines identified by the Beninese authorities: artemether-lumefantrine, quinine sulphate, cefixime and ciprofloxacin tablets. Beyond these first four products, the platform is designed as an extensible infrastructure that will be populated with other essential medicines.

Preliminary results demonstrate promising performance in active ingredient identification and the transferability of models across instruments. The next steps will focus on quantification and the integration and comparison of data within the information system.