## Research Article

# On Using a Mobile Application to Support Teledermatology: A Case Study in an Underprivileged Area in Colombia

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*Background.* The use of mobile applications in dermatology to support remote diagnosis is gaining acceptance, particularly in rural areas, where dermatology services are commonly managed by healthcare personnel with no specialty training. Moreover, ontologies—sets of concepts that represent knowledge in a given domain—are increasingly being used to support medical diagnosis. A specific case is ONTODerm: an ontology to aid dermatological diagnosis. However, there is little information on the combined use of mobile applications and ontologies as support solutions in dermatology. *Objective.* Assessing the reliability of ONTODerm as a tool to support remote dermatological diagnosis when used together with a mobile dermatological application in underprivileged areas. *Methods.* A mobile application that allows characterization of skin lesions was developed, and the information about the lesions was sent to ONTODerm. An exploratory study was conducted in a remote area without access to a dermatologist. A total of 64 dermatological queries were recorded in the application and consulted with ONTODerm. Later, an experienced dermatologist evaluated the characterization and diagnosis of each query to determine the accuracy of the system. *Results.* The results showed that the probability of obtaining a correct diagnosis was between 64.4% and 85.6% with a confidence interval of 95%. A higher accuracy rate was obtained when the skin lesion occurred on the face or when its border was categorized as poorly demarcated. *Conclusions.* This study demonstrates the implementation of a teledermatology strategy based on mobile applications and domain ontology-driven knowledge base to provide timely assistance to healthcare professionals. This approach was found to be pertinent in the Colombian rural context, particularly in forest regions, where dermatology specialists are not available. The results of this article do not represent a final validation of the proposed approach; they suggest how the ontology can be improved to effectively support medical staff in marginalized regions.

## 1. Introduction

The use of mobile health applications (or mHealth) to support telemedicine is becoming widely adopted. The ease of use and the ubiquity of mobile phones make their use in remote diagnostic applications increasingly viable [1–3].

Mobile applications are also popular in teledermatology [4–8]: the use of telecommunication technologies to support the diagnosis and treatment of skin conditions. These applications are particularly relevant in remote locations, where the possibility of finding a dermatology practice is low. In Colombia, according to the Colombian Association of Dermatology, there were 1.25 dermatologists per 100,000 inhabitants in 2011, with a large number of them in larger and more densely populated cities (3 per 100,000 inhabitants), thus leaving rural areas without specialized dermatological care options [9].

In rural areas, dermatological services are commonly provided by medical staff without dermatology expertise. Consequently, complex queries are sent to specialists by email, and the answers may take several days to arrive. Under these circumstances, the use of mobile applications to enable real-time dermatological diagnosis (in a rural context) has a great potential in countries like Colombia [10].