

Development and Validation of a PostgreSQL-Based Framework for Field-Level Data Collection to Assess Multidimensional Postmenopausal Obesity and Associated Health Complications

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Postmenopausal obesity is a complex health issue influenced by anthropometric, nutritional, biochemical, and psychological factors. Healthcare professionals face challenges due to heterogeneous data collection and reporting standards. To address this, the present study developed and piloted a digital data management system using PostgreSQL enabling support multidimensional analysis of postmenopausal obesity. The system includes a relational database for patient demographics and health metrics to store across five domains. Data entry forms designed for effective field data collection, with real-time access, secure storage, and role-based access controls to maintain data integrity and confidentiality. Data stored in PostgreSQL was analyzed using R built in R-Studio. R facilitates statistical computations among variables. A mobile application, developed using Flutter integrated with PostgreSQL database was used to present selected research findings and to collect novel data in both clinical and community settings. Preliminary testing was conducted using secondary datasets on nutrition, physical activity, and obesity sourced from Kaggle. The Center for Disease Control (CDC) was used to validate the usability, scalability, and reliability of the system through validation techniques reinforced by Structured Query Language domain, entity and referential integrity constraints, ensuring data accuracy and validity. The framework integrates modules for anthropometry, dietary intake, biomarker profiling, and psychological assessments, forming the basis for a predictive model based mobile decision support system that facilitates early intervention and management of postmenopausal obesity. Key features include legacy systems compatibility, external repository connectivity, and efficient data management. Future development will focus on predictive model integrated mobile application 'PostMeno360' for effective digital transformation in Sri Lanka's healthcare system.

Keywords: Digital Health Data Collection, Multidimensional Health Assessment, PostgreSQL Framework, Postmenopausal Obesity

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