Research Paper
Impact Factor: 7.352
Peer Reviewed Monthly Journal
www.ijmdrr.com

IJMDRR
E- ISSN –2395-1885
ISSN -2395-1877

AMRUTHSWASTHBHARATHBODY VITALS MONITORING SYSTEM A PROOF-OF-CONCEPT STUDY

Dr. Ramakanta Prusty
Principal, B. P. College of Business Administration, Faculty of Management, Kadi Sarva Vishwavidyalaya, Gandhinagar. Gujarat.

Abstract
Body Vitals are very important to know the health of the body. If we able to get accurate measurement, in short span of time, it will be beneficial for doctors to diagnose accordingly. For example, Anemia and other low body vital related diseases may lead to major health complications and therefore early and accurate measurement of vital levels is quite crucial. Accurate measurement of body vitals is important because they directly reflect the blood's ability to carry oxygen, blood circulation etc. which is essential for life. Diagnosing anemia and polycythemia, guiding clinical decisions, monitoring treatment, pre-surgical assessment etc. are some of the very important medical performances which are directly dependent on body vital monitoring system. Even small inaccuracies can lead to misdiagnosis or inappropriate treatment. The present study evaluates the reliability of the AmruthSwasthBharath mobile application in estimating body vitals compared to hospital laboratory reports. A total of 496 patients were assessed at a tertiary hospital in Hyderabad between July 20 and August 25, 2025. Vitals including blood pressure, heart rate, respiratory rate, oxygen saturation (SpO_2), hemoglobin (ASB vs. hospital), stress scores, and PRQ were recorded. Results demonstrate a strong correlation between ASB and hospital hemoglobin values ($r = 0.95$, mean difference $\approx$ 1 g/dl), confirming the reliability of the device. Predictive modeling of hemoglobin and PRQ using vital parameters showed poor performance ($R^2 < 0.1$), indicating that direct measurement remains necessary. Cluster analysis identified three clinically meaningful patient groups: (1) healthy/stable individuals, (2) high-stress patients with elevated heart rate and respiratory rate, and (3) low-hemoglobin individuals resembling anemia risk. Outliers in SpO_2 and stress values suggested occasional data entry or device artifacts. The ASB system demonstrates strong potential for scalable community health screening, particularly in resource-limited settings.

Key Words: Amruth Swasth Bharath, Vital Parameters, Community Health.

Introduction

Body vitals measurement is a cornerstone of clinical practice, particularly for detecting anemia, which remains a major public health challenge in India. Traditional laboratory-based vitals testing, while accurate, can be resource-intensive and inaccessible to underserved population. Mobile and portable diagnostic systems offer a promising alternative for mass screening. Amruth Swasth Bharath, a trademark of Bisam Pharmaceuticals Private Limited, is at the forefront of modern healthcare innovation. It leads the way in modern health monitoring with advanced technology and a focus on user-centric design. The mobile applications are securely registered On-Cloud, ensuring global accessibility while adhering to stringent Indian legislative standards for data protection and privacy. With a mission to redefine health monitoring, Bisam Pharmaceuticals Private Limited leverages cutting-edge technology and user-centric design to deliver solutions that are accessible, secure, and reliable. The Amruth Swasth Bharath (ASB) application is designed as a portable diagnostic tool to measure hemoglobin and assess stress-related parameters. This proof-of-concept study was conducted to validate the body vital measurements of the ASB application against hospital laboratory reports and to analyze patterns in associated clinical parameters such as blood pressure, oxygen saturation, stress scores, and PRQ.

Study Objective

The objective of the present study is to evaluate the reliability of the Amruth Swasth Bharath mobile application in estimating body vitals compared to hospital laboratory reports.

Review of Literature

Accurate assessment of body vitals such as hemoglobin (Hb) concentration is essential for diagnosing and managing anemia, polycythaemia, and various other hematological and systemic conditions. Traditional laboratory-based methods, such as the cyanmethemoglobin and automated hematology analyzer techniques, are considered the gold standard for Hb estimation due to their high precision (World Health Organization, 2011). However, these methods require venous blood samples, skilled personnel, and laboratory infrastructure, which can limit accessibility in rural or resource-constrained settings (Patel et al., 2020).

To address these limitations, several non-invasive and portable body vital measurement technologies have been developed. Point-of-care (POC) devices, such as HemoCue and Pronto-7, have shown promising results in improving accessibility and rapid screening, though their accuracy varies depending on environmental factors, skin pigmentation, and perfusion levels (Chaudhary et al., 2019; Butwick et al., 2021).

Recent advancements in mobile health (mHealth) technologies have introduced smartphone-based applications capable of estimating physiological parameters, including hemoglobin, using optical sensors and image analysis. Studies evaluating such apps—like HemaApp, SmartHb, and other photoplethysmography (PPG)-based systems—have reported strong correlations ($r = 0.85–0.95$) with standard laboratory results, indicating potential for large-scale screening (Wang et al., 2017; Mannino et al., 2018). Nevertheless, issues such as device calibration, lighting conditions, and patient variability remain challenges for clinical adoption (Mollan et al., 2020).

Moreover, integration of machine learning and predictive analytics using vital signs (heart rate, SpO_2, respiratory rate, etc.) for hemoglobin estimation has been explored, but with limited success (R^2 typically < 0.2), suggesting that direct measurement remains the most reliable approach (Sarin et al., 2022).

Cluster-based and data-driven analyses have also been employed to classify patient risk profiles, aiding in targeted screening and intervention strategies (Gupta et al., 2023). Such approaches complement mobile-based systems by enhancing interpretation and personalization of results.

In summary, literature supports the growing reliability and potential of mobile-based body vital estimation systems, particularly for community-level and remote health monitoring, while emphasizing the continued need for validation against standard laboratory methods.

Research Design

Study Design: This cross-sectional proof-of-concept study was conducted at a tertiary care hospital in Hyderabad from July 20 to August 25, 2025. A total of 496 patients undergoing routine vitals measurement, were enrolled which is the sample size of the study.

Data Collection and Cleaning: Parameters on which data were collected included blood pressure (systolic and diastolic), heart rate (beats per minute), respiratory rate (breathe per minute), oxygen saturation (SpO_2%), Hemoglobin measured in hospital laboratory (g/dl), stress level (MS scale), and

PRQ (psychological stress index). After collection, data cleaning was administered by excluding the outliers based on clinical plausibility. The outliers excluded comprise: SpO_2restricted to 85 – 100%, Systolic BP: 80-200 mmHg; Diastolic BP: 50-120 mmHg, and Hospital hemoglobin capped at 20 g/dl to remove spurious values.

Statistical Tools Used: Statistical tools such as descriptive statistics, Pearson Correlation, Linear Regression and K-means were used for analyzing the data. In descriptive statistics the authors have used mean, standard deviation and range while Pearson correlation was used to compare vital values between Amruth Swasth Bharat vs. hospital. Linear regression was used to test the predictive power of vital for Hb and PRQ, and K-means were calculated to identify patient subgroups.

Results and Discussion

Descriptive analysis revealed the following results:

- Mean systolic BP = 120 mmHg; diastolic BP = 80 mmHg.
- Mean heart rate = 78 bpm; respiratory rate = 19/min.
- Median SpO_2 = 99%, with outliers detected.
- Mean hemoglobin: 12.5 g/dl (ASB app) vs 13.2 g/dl (hospital).
- Stress and PRQ values showed wide variability.

Correlation analysis revealed that the ASB hemoglobin values were strongly correlated with hospital values (r = 0.95). As far as stress and PRQ are concerned, both are found to have a very weak correlation with r value of 0.07. Blood pressure and heart rate showed expected internal correlations, for example, systolic vs. diastolic r = 0.86.

The linear regression results show that Hb and PRQ had poor accuracy with $R^2 < 0.1$ and direct measurement of Hb is quite important.

The ASB app demonstrated strong reliability in measurement of body vitals, nearly matching laboratory results. This supports its use as a community screening tool for anemia, particularly in rural and resource-limited settings.

The lack of predictive power for Hb and PRQ from vitals underscores the need for direct measurement. PRQ, in particular, appears to capture dimensions not directly linked to physiological parameters, such as psychological or environmental stress.

Clustering analysis provided useful insights into patient stratification, highlighting subgroups at potential health risk, including high-stress individuals and those with low hemoglobin. Such stratification could guide targeted interventions.

However, the presence of outliers in SpO_2 and stress indicates occasional device or data entry errors, emphasizing the importance of data validation in large-scale deployments.

Conclusion

The ASB app provides reliable body vital measurements consistent with hospital laboratory standards. While vital signs and stress data cannot substitute vital testing, clustering analysis demonstrates added value in identifying risk groups. The system holds promise as a scalable solution for anemia detection and stress profiling, with potential for deployment in community health programs. With revolution of Artificial Intelligence in the field of health monitoring it is important that the right innovative steps are

taken in order to take maximum benefit from AI. Amruth Swasth Bharath appears as the pioneer in seamlessly integrating AI for providing real-time, non-invasive insights into critical health metrics enabling smarter and more proactive health management.

For rendering maximum benefit to the society the following recommendations could be made with regard to ASB. Since ASB app is effective it must be deployed for community-based health screening. It is also suggested to incorporate clustering analytics into triage systems for early risk identification. Establishing robust data validation pipelines to minimize outliers and use of complementary psychometric tools for comprehensive PRQ assessment are also highly recommended.

References

1. Chutipongtanate, C., Yasaeng, C., Virankabutra, T., et al. (2020). Systematic comparison of four point-of-care methods versus the reference laboratory measurement of hemoglobin in the surgical ICU setting: a cross-sectional method comparison study. BMC Anesthesiology, 20, 92. https://doi.org/10.1186/s12871-020-01008-8.
2. Digital Hemoglobinometers as point-of-care testing devices for hemoglobin estimation: a validation study from India. (2022-2023?). Indian Journal of Community Medicine. (Exact date retrieved from digital source: Jan 2019 for the study). PMC article. ("Digital Hemoglobinometers…"). PMC ID: PMC7877427.
3. Hruschka, D., Gupta, R., & Coates, J. (2020). Surveys: the HemoCue® analyzer is the most routinely used device to measure hemoglobin concentrations in field settings […] many methodological factors influence its accuracy. BMC Public Health, 20(422).
4. Karakochuk, C., et al. (2019).Measurement and interpretation of hemoglobin concentration in clinical and field settings: a narrative review.Annals of the New York Academy of Sciences.https://doi.org/10.1111/nyas.14003.
5. Tan, S. Y. L., Chai, J. X., Choi, M., Javaid, U., Chow, B. S. Y., & Abdullah, H. R. (2025).Remote photoplethysmography technology for blood pressure and hemoglobin level assessment in the preoperative evaluation setting: Algorithm development study. JMIR Formative Research, 9, e60455. https://doi.org/10.2196/60455.