Dinkum Journal of Medical Innovations

Vol. 5 No.03 (2026) | Page: 225-236 | Original Article

Home Blood-Pressure Self-Monitoring for Hypertension Detection in Rural India: Critical Interpretation of EASE-BP and a Scale-Up Framework for Primary Care

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Citation

Md. Abdul Kader (2026). Home Blood-Pressure Self-Monitoring for Hypertension Detection in Rural India: Critical Interpretation of EASE-BP and a Scale-Up Framework for Primary Care. *Dinkum Journal of Medical Innovations*, 5(03): 225-236. https://doi.org/10.71017/djmi.5.03.d-0592

DOI

https://doi.org/10.71017/djmi.5.03.d-0592

Identification

D-0592

Publication History

Submitted: 29-01-2026
Accepted: 11-03-2026
Published: 31-03-2026

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ABSTRACT

Background: India carries a large and incompletely detected hypertension burden. Clinic-based screening is constrained by limited contact with primary care, travel costs, variable measurement quality, and the biological variability of blood pressure.

Objective: This article critically interprets the published EASE-BP trial, its 2024 protocol and World Health Organization technical report, and peer-reviewed evidence published primarily during 2021–2026.

Methods: The analysis evaluates trial design, measurement strategy, intervention fidelity, effect interpretation, equity, implementation, cost, digital linkage, and compatibility with India's primary-care and hypertension-control programmes. CONSORT, implementation-science, and blood-pressure measurement principles guide the appraisal.

Results: In adults without known hypertension, home self-monitoring increased detection: 25% versus 11% using a 140/90 mmHg standard threshold and 43% versus 11% when the lower home threshold was applied. The intervention also produced substantial detection among family members, suggesting a household spillover effect.

Conclusion: Home monitoring can move hypertension detection from episodic facilities into households, but readings become clinically valuable only when devices are validated, cuffs fit, technique is correct, repeated measurements are averaged, abnormal results are confirmed, and referral and treatment systems respond.

Keywords: hypertension, self-measured blood pressure, home blood-pressure monitoring, India

1. INTRODUCTION

Hypertension is the leading modifiable contributor to cardiovascular disease, stroke, chronic kidney disease, heart failure, and premature death. It is usually asymptomatic, so detection depends on measurement rather than symptoms [1]. The World Health Organization (WHO) defines hypertension in adults as systolic blood pressure of at least 140 mmHg or diastolic blood pressure of at least 90 mmHg measured on two different days, while several professional guidelines use lower thresholds for diagnosis or treatment decisions in selected populations [2]. Whatever threshold is adopted, a single casual reading is a weak basis for classification because blood pressure varies with activity, stress, recent caffeine or tobacco use, posture, cuff size, talking, room conditions, and regression to the mean.India's challenge is not only high prevalence but also a cascade problem: many adults have never been measured under standardized conditions; many who have elevated readings are not confirmed; many diagnosed individuals are untreated; and many treated individuals remain uncontrolled. National survey data indicate elevated blood pressure in roughly one quarter of adult men and more than one fifth of adult women, with substantial variation by state, age, residence, socioeconomic position, and diagnostic definition [3]. The India Hypertension Control Initiative (IHCI) has shown that protocol-based treatment, drug availability, patient tracking, team-based care, and decentralized follow-up can improve control, yet case detection remains a bottleneck.Conventional clinic screening captures people who attend health services. Rural residents, informal workers, caregivers, and people who perceive themselves as healthy may not attend frequently. Community campaigns increase reach but are episodic and resource intensive. Home self-measurement offers a different architecture: a validated device is placed near the person, repeated readings are taken in the usual environment, and family members can become engaged. Home readings can reduce white-coat effects and provide more observations than a single visit [4]. They can also generate false reassurance, anxiety, overdiagnosis, or unsafe self-adjustment if measurement and clinical response are poorly designed.EASE-BP—Effectiveness of Home-Based Self-monitoring of Blood Pressure in a Primary Care Set-up of India—was designed to address the Indian evidence gap. The open-label randomised trial enrolled two distinct rural populations under the Ballabgarh Health and Demographic Surveillance System: adults who reported no previous hypertension and adults with known hypertension. The intervention group received a validated automated upper-arm monitor, training, written education, and a logbook; control participants received education and were advised to obtain measurements at nearby subcentres or primary health centres [5].The definitive EASE-BP trial report was published in The Lancet Primary Care in July 2026 [6]. Reusing its exact title or rewriting its results as new research would be duplicate publication. This article therefore takes a different and value-adding approach: it critically evaluates what the trial establishes, what it does not establish, and how the intervention could be translated into an equitable national detection pathway. It also develops a practical framework linking devices, measurement quality, confirmation, referral, treatment, and programme indicators [7].

2. EVIDENCE BASE AND ANALYTICAL APPROACH

This is a structured critical synthesis rather than a new patient-level analysis. The focal sources were the EASE-BP protocol, WHO South-East Asia technical report, and definitive trial publication [3–5]. These were interpreted alongside recent systematic reviews, randomized trials, international measurement guidance, WHO policy material, Indian hypertension literature, and implementation research published mainly from 2021 through July 2026. Older sources were retained only where they remain foundational for blood-pressure measurement or self-monitoring [8]. The appraisal addressed nine domains: population and setting; randomization and masking; intervention and comparator content; measurement schedule and thresholds; outcome ascertainment; intention-to-treat analysis; household spillovers; equity and acceptability; and scale-up requirements. The distinction between

efficacy, effectiveness, and implementation was maintained [9]. A device may be technically accurate, an individual may measure correctly, a trial may improve detection, and a health programme may still fail to reduce cardiovascular events if confirmatory diagnosis and treatment do not follow.No unreported EASE-BP result was created. Numerical claims are limited to values available in the trial report or WHO technical report [10]. The article uses CONSORT principles for randomized-trial interpretation and distinguishes prespecified outcomes from exploratory findings. Because the trial was open label, particular attention is given to performance bias, differential measurement frequency, outcome opportunity, and the fact that detection is partly generated by exposure to the measurement process [6]. It is not treated as evidence of the clinical effectiveness of cuff-based home blood-pressure monitoring [11].

3. EASE-BP DESIGN AND INTERVENTION LOGIC

EASE-BP consisted of mutually exclusive trial populations. Part A included adults aged at least 30 years who reported no history of hypertension, were not currently or previously taking antihypertensive medication, had no cardiovascular comorbidity, and were willing to measure at home or attend a health facility. Part B included adults aged at least 18 years with hypertension previously diagnosed by a physician or current antihypertensive treatment. Pregnant or lactating people and those unable or unwilling to self-monitor were excluded [3,4]. These criteria created a detection cohort and a management cohort with different causal questions.Participants were recruited from geographically separated villages served by the Ballabgarh surveillance system, approximately 40 km south of New Delhi. Eligible individuals were allocated 1:1 using computer-generated block randomization with blocks of four. Serially numbered opaque envelopes supported allocation concealment. Participants and field staff could not be blinded to device provision, but the report states that investigators and biostatistical outcome assessors were blinded [12]. Open-label design was unavoidable because a physical monitor and training were visible.The intervention used a validated Omron HEM-7156 automated upper-arm monitor. Research staff taught standardized technique, provided local-language educational material on hypertension and atherosclerotic cardiovascular risk, advised measurement at least twice monthly or more often, and supplied a diary. The comparator was active rather than no care: control participants received the same educational content and were instructed to obtain blood-pressure measurements at village subcentres or primary health centres, where devices were available. This comparator makes the policy question realistic: household access versus facility access when both groups receive information.The causal pathway was straightforward. Device proximity should lower the time, travel, and opportunity cost of measurement [13]. Training should improve technique and self-efficacy. Repeated exposure should increase the probability of detecting sustained or episodic elevation. Logging should make results available for review. For people with known hypertension, feedback could reinforce medication adherence and lifestyle change. Family access to the device could create spillovers. Every step, however, depends on fidelity: possession does not guarantee correct use, recording does not guarantee clinical interpretation, and detection does not guarantee confirmation or treatment [14].

4. WHAT THE DETECTION RESULTS MEAN

The clearest EASE-BP finding arose in Part A. Under a standard threshold of at least 140/90 mmHg, new hypertension was detected in 25% of intervention participants versus 11% of controls [15]. When the recommended lower home threshold of at least 135/85 mmHg was applied to home readings, detection in the intervention group reached 43%, compared with 11% in the facility-monitoring control group [4]. These differences are large and operationally important.The first estimate asks whether greater access to measurement detects more people crossing a common conventional threshold. The second combines increased access with a threshold appropriate to out-of-office measurement. It

should not be interpreted simply as proof that 43% had definitive hypertension. The probability of crossing a threshold rises when more measurements are taken, and the technical report defined detection using one or more qualifying logbook measurements [16]. Clinical diagnosis normally requires a structured series and confirmation unless blood pressure is severely elevated or urgent clinical circumstances exist. Thus, the trial strongly demonstrates an ascertainment effect and plausibly a true improvement in case finding. It does not eliminate the need for a confirmation algorithm. A scalable pathway could trigger confirmation after an average home blood pressure of at least 135/85 mmHg across a defined seven-day schedule, repeated clinic readings, or ambulatory monitoring where available [17]. Very high values or symptoms suggestive of acute organ injury require urgent assessment rather than routine confirmation.Detection yield also depends on baseline risk. Part A excluded known cardiovascular comorbidity and relied on self-reported absence of hypertension, so some participants may have had previously elevated but undocumented readings. Obesity and central adiposity were common in the cohort, increasing prior probability [18].

Table 01: Proposed EASE-BP-to-scale implementation cascade

Stage	Core action	Quality indicator	Failure signal
Access	Validated monitor and correct cuff	Eligible people with device access	Device present but inaccessible
Competency	Demonstration and teach-back	Correct technique at reassessment	Persistent positioning errors
Measurement	Structured repeated home series	Valid days and readings completed	Isolated or selectively logged values
Confirmation	Average-based clinical confirmation	Time from screen to confirmed status	Screen-positive people lost
Treatment	Protocol-based therapy and supply	Confirmed cases starting treatment	Diagnosis without medication
Control	Titration and longitudinal follow-up	Control at 6 and 12 months	Readings collected without response
Equity	Assisted and inclusive delivery	Reach by sex, disability and remoteness	Benefits concentrated in advantaged groups

The results are highly relevant to similar rural North Indian communities but should not be mechanically extrapolated to younger populations, urban settings, tribal areas, or states with different risk and service access.The practical interpretation is that facility advice alone leaves a measurement gap. Both groups were asked to monitor at least twice monthly and received education; the principal contrast was ready access to a household device. If an active, supported control achieved only 11% detection, routine care with less education and weaker follow-up may miss even more people. Conversely, programme-scale performance may be lower than trial performance because field teams in trials provide training, motivation, device maintenance, and follow-up.

5. HOUSEHOLD SPILLOVERS: AN UNDERUSED IMPLEMENTATION OPPORTUNITY

EASE-BP allowed eligible family members to use the monitor and examined additional detection. The WHO report found markedly higher odds of hypertension detection among family members associated with the intervention, with odds ratios exceeding 17 across threshold definitions and wide confidence intervals [4]. Although exploratory and dependent on who chose to measure, this finding reframes the unit of intervention from the individual to the household.A household device has a different economic logic from a personal device. Fixed cost can be distributed across several adults, healthy relatives are exposed to screening, and family support may strengthen technique and adherence. A younger literate member may assist an older adult. On the other hand, privacy, gender hierarchy, device control, fear, and conflict over abnormal readings can limit access. Programmes should measure who actually uses the device rather than assuming equal household availability.India could test shared-device models through self-help groups, accredited social health activists, health and wellness centres, pharmacies, workplaces, and village organizations. The optimal arrangement will vary by population density and trust. Shared devices require infection-control guidance, cuff-size availability, booking or rotation systems, accountability for damage, battery replacement, calibration checks, and a route for results. Household spillovers should be prespecified in future cluster trials to avoid contamination being treated merely as a nuisance.

6. WHY BLOOD-PRESSURE CONTROL DID NOT IMPROVE CLEARLY

In Part B, adjusted analyses based on research-staff measurements did not show a clear association between the intervention and change in systolic or diastolic pressure over three months [4]. This does not negate the detection result. Detection and control are different interventions. A monitor supplies information; control usually requires medication initiation or titration, reliable drug supply, adherence support, lifestyle intervention, clinician response, and sufficient time.The active comparator again matters. Both groups received detailed education, diaries, and access to measurement at public facilities. Education could improve adherence and behaviour in both arms, reducing contrast. Three months may be adequate to observe early pressure change but short for a sustained treatment pathway. Clinicians were not necessarily operating under a tightly coupled titration protocol driven by transmitted home averages. Without that feedback loop, participants may record high values without treatment intensification.Home monitoring alone has shown inconsistent effects in the wider literature. Meta-analyses generally find larger blood-pressure reductions when self-monitoring is combined with co-interventions such as telemonitoring, pharmacist or nurse support, medication titration, counselling, or digital feedback [7–10]. The inference is not that self-monitoring is ineffective, but that it is an information component whose impact depends on what the health system does with the information.Regression to the mean can also affect participants enrolled with high baseline values. Research-staff follow-up readings may improve because of standardized rest, repeated measurement, or general trial engagement in both groups. Differential missingness, medication changes, device use, and measurement frequency should be reported. Per-protocol analyses can describe dose-response but cannot replace intention-to-treat estimates because adherent users differ systematically from non-users.

7. MEASUREMENT VALIDITY AND DIAGNOSTIC SAFETY

A national programme must protect the validity of every reading. Only devices validated under recognized protocols should be procured. Model-level validation matters; approval of one device does not validate every model from the same manufacturer. Upper-arm devices are generally preferred to wrist devices. Cuffs must fit arm circumference, a major issue in populations with both low body mass and obesity. Procurement based only on price risks systematic error at national scale.Standard technique includes avoiding exercise, smoking, caffeine, and a large meal for about 30 minutes; emptying the bladder; sitting quietly for five minutes; supporting the back and feet; keeping legs

uncrossed; supporting the bare arm at heart level; using the correct cuff; not talking; and taking repeated readings. Initial bilateral measurement can identify an important inter-arm difference. Training should use demonstration and teach-back, not leaflets alone.Twice-monthly measurement is pragmatic for engagement, but diagnosis is usually better supported by a concentrated schedule—for example, two morning and two evening readings for three to seven days, discarding the first day where recommended and averaging the remainder. Programmes need a simple algorithm that communities and frontline workers can follow. A single high reading should trigger repetition; an average above the home threshold should trigger clinical confirmation; severe readings or warning symptoms should trigger urgent referral.Home monitoring can identify white-coat hypertension, but it may also identify masked hypertension—normal clinic readings with high out-of-office pressure. Both categories carry implications for follow-up and risk assessment. Ambulatory blood-pressure monitoring remains a strong reference method but is less accessible. A tiered Indian strategy could use structured home averages for most adults and reserve ambulatory monitoring for discordant, borderline, resistant, or clinically complex cases.Data integrity matters. Paper diaries are accessible but can contain transcription errors, rounding, selective recording, or backfilling. Device memory improves verification but may not identify the user in shared households. Bluetooth transfer can timestamp readings but introduces cost, connectivity, cybersecurity, and digital-literacy requirements. The goal is not maximal technology; it is a trustworthy link between a correctly identified person, a valid reading, and an appropriate clinical action.

8. EQUITY, ACCEPTABILITY, AND UNINTENDED CONSEQUENCES

Device-based strategies can reduce geographic barriers but create new inequities. People who cannot read numbers, have visual or cognitive impairment, lack arm mobility, work irregular hours, or fear technology may be excluded [20]. Women may have less control over a household device. Larger cuffs may be unavailable. Batteries, repair, and replacement may be unaffordable. A programme that distributes monitors without ongoing support can benefit the most resourced households and widen disparities.EASE-BP excluded people unable to undertake self-monitoring, which is reasonable for an explanatory pathway but limits generalizability. Scale-up must include assisted measurement by a family member, community health worker, pharmacist, or nurse. Instructions should be available in local languages and use pictures, audio, and teach-back. Device interfaces should have large displays and minimal steps [21]. Programmes should collect sex-, age-, disability-, caste-, income-, and geography-disaggregated uptake and confirmation data.Repeated measurement can cause anxiety or compulsive checking. Participants may stop medication after a normal reading, double doses after a high reading, or seek emergency care unnecessarily. Clear safety messages are essential: do not change prescribed treatment without advice; repeat unexpected values after rest; know urgent symptom and threshold rules; and bring or transmit the record for review. These safeguards should be part of the intervention, not an afterthought. Acceptability is relational. People are more likely to use home data when clinicians respect it and provide a predictable response. If frontline staff dismiss readings or facilities cannot confirm and treat, monitoring loses credibility. Community co-design should examine preferred device ownership, measurement schedules, who provides training, how results are shared, and what response time is acceptable [21].

9. INTEGRATION WITH INDIAN PRIMARY CARE AND IHCI

The main policy opportunity is to connect home measurement with India's existing primary-care architecture rather than create a parallel vertical programme. Health and wellness centres, subcentres, primary health centres, accredited social health activists, auxiliary nurse midwives, community health officers, and IHCI registries can support different components [22]. Task design should be explicit so that new monitoring does not overload frontline workers.A practical pathway begins with risk-informed

invitation or opportunistic screening. Devices can be loaned to households for a structured seven-day period or shared for longer surveillance. Trained workers verify technique and cuff fit. Readings are averaged according to a standard rule. Normal results lead to scheduled rescreening; borderline results trigger repetition; probable hypertension triggers confirmation and cardiovascular-risk assessment; severe results trigger timely clinical review. Confirmed patients enter the treatment registry and receive protocol-based care.The programme should close the loop. A reading transmitted without acknowledgement is not care. Dashboards or paper registers should identify people awaiting confirmation, confirmed but untreated, treated but overdue, and uncontrolled. Medication stock and titration authority must match detection volume [23]. If case finding expands faster than treatment capacity, the programme can create diagnosis without benefit and erode trust.Home monitoring can support differentiated follow-up. Stable controlled patients may need fewer facility visits, reducing crowding and travel, while uncontrolled or high-risk patients receive more intensive review. This could improve efficiency, but non-inferiority of reduced-visit pathways should be evaluated. Clinical decisions should use averaged values and total cardiovascular risk, not isolated readings. The literature on consumer-centred monitoring highlights the broader movement toward wearable and patient-generated health data [6]. Cuffless watches and photoplethysmography are attractive but should not replace validated cuff-based measurement for diagnosis until model-specific accuracy is demonstrated across skin tones, ages, rhythms, pressures, and real-world conditions. Innovation must be governed by clinical validation rather than marketing [24].

10. DIGITAL ARCHITECTURE AND DATA GOVERNANCE

Digital linkage can reduce transcription and accelerate response, but India should avoid designing a smartphone-only pathway. A tiered system can support device memory, SMS or interactive voice response, assisted entry by community workers, and app transmission where feasible. Offline functionality is essentiall [25]. Unique health identifiers can improve continuity but require careful consent and alternatives for people without digital identity access.Minimum data include participant identifier, device model, cuff size, date and time, systolic and diastolic pressure, pulse, context flags, confirmation status, referral, diagnosis, treatment, and follow-up. Programmes should store averages and retain enough raw readings for quality review. Automated alerts must be clinically calibrated to avoid alarm fatigue. Algorithms should never advise unsupervised medication changes.Blood-pressure data are sensitive health information. Governance must specify purpose limitation, role-based access, encryption, retention, audit trails, breach response, and rules for vendor access. Commercial reuse should not be hidden in consent. Shared household devices complicate identity matching; systems need user selection or supervised assignment without exposing one person’s results to another [22]. Interoperability with national noncommunicable-disease platforms is preferable to proprietary silos. Procurement contracts should require data portability, documented application programming interfaces, security updates, and continuity if a vendor exits. Digital success indicators should include completeness, latency, failed transmissions, duplicate records, equity of access, and action after alerts—not merely the number of readings uploaded [19].

11. ECONOMIC AND IMPLEMENTATION EVALUATION

The EASE-BP result establishes a reason to evaluate scale-up, not an automatic case for universal device purchase. Economic analysis should compare household ownership, time-limited loans, community sharing, pharmacy models, and facility-based screening [21]. Costs include devices, cuffs, batteries, replacement, calibration checks, staff training, follow-up, data systems, confirmatory visits, and treatment generated by detection. Household savings from reduced travel and wage loss should also be counted.Cost per additional confirmed case is a useful intermediate outcome but insufficient. Models should estimate cost per patient treated and controlled, cardiovascular event prevented,

disability-adjusted life-year averted, and equity impact [9]. False-positive pathways create confirmatory costs; false negatives lose benefit. Device life and household sharing strongly affect cost-effectiveness. Price sensitivity and local manufacturing may change the result.Implementation outcomes should be prespecified: reach, adoption, fidelity, acceptability, appropriateness, feasibility, cost, penetration, and sustainability. Clinical outcomes should include confirmation, treatment initiation, blood-pressure control, medication adherence, adverse responses, and cardiovascular events over longer follow-up 4]. Hybrid effectiveness-implementation designs are well suited because delivery failure and clinical failure must be separated.A pragmatic cluster-randomised trial could compare health-centre screening, community-worker shared devices, household loan kits, and digitally supported home monitoring. Clustering would reduce contamination from family device sharing. Follow-up of at least 12 months would permit assessment of sustained control, device attrition, and treatment continuity. Embedded qualitative research should examine non-use and unintended effects. An equity-stratified budget impact analysis would help states decide which model fits their infrastructure [17].

12. STATISTICAL AND REPORTING STANDARDS FOR FUTURE TRIALS

Future trials should define whether the primary estimand is assignment to device access, actual use, or a programme strategy. Intention-to-treat analysis preserves randomization and should remain primary. Complier-average causal effects may supplement it when assumptions are stated [12]. Per-protocol results should use prespecified adherence definitions and account for post-randomization selection.Detection outcomes require equal opportunity or careful interpretation. If the intervention arm takes many more readings, a higher proportion crossing a threshold is partly the mechanism, not conventional ascertainment bias. Researchers should report number of days measured, readings per person, valid reading proportion, and detection per 100 participants and per 100 measurement episodes. Confirmation should be a separate outcome from screen positivity [4]. Threshold analyses should be prespecified. Applying 135/85 mmHg to home measurements and 140/90 mmHg to clinic measurements is clinically defensible, but comparisons should also use common thresholds and averaged values. Sensitivity analyses can require multiple elevated days, exclude the first day, use morning and evening averages, and examine severe thresholds. Continuous changes in systolic and diastolic pressure should accompany binary control.Missing data should be reported by arm and reason. Assuming non-users were undetected is conservative for assignment effects but does not reveal their true status. Multiple imputation may be appropriate for some follow-up outcomes, while tipping-point analyses can assess robustness [21]. Family-member analyses should account for household clustering and clearly distinguish randomized index participants from non-randomized relatives.CONSORT flow diagrams, protocol deviations, harms, device failures, intervention fidelity, and statistical analysis plans should be available. Trial registration and outcome consistency should be checked. Deidentified individual data may require governed access, but code, data dictionaries, blank forms, and aggregate tables can be shared. Reporting should avoid the claim that a programme “diagnoses” hypertension when it only identifies elevated readings [18].

13. STRENGTHS AND LIMITATIONS OF EASE-BP

EASE-BP’s strengths include random allocation, allocation concealment, a validated automated device, an active policy-relevant comparator, community recruitment, inclusion of detection and management populations, intention-to-treat analysis, local-language education, and assessment of household spillovers. Conduct within an established surveillance system enabled door-to-door sampling and reliable follow-up. The trial addresses a major evidence gap from rural India rather than importing conclusions from high-income settings.Limitations include open-label delivery, short three-month follow-up, restriction to two villages within one North Indian surveillance site, and exclusion of people unable to self-monitor. Measurement frequency differed by intervention access and some detection

definitions relied on any elevated logged measurement, which may overstate confirmed hypertension. Education in both groups may have reduced contrast for control outcomes. Household use introduces beneficial spillover but complicates individual-level inference.The trial did not establish long-term cardiovascular benefit, nationwide cost-effectiveness, or superiority of home monitoring as a stand-alone control intervention. Nor should one device model be assumed to represent all market devices. These limitations narrow the claim but do not erase the finding: placing a validated monitor in the home, with training and education, substantially increased identification of elevated blood pressure compared with asking adults to attend facilities.

14. VALUE-ADDED SCALE-UP FRAMEWORK

A national strategy can be organized into eight linked functions. First, target populations using age, prior readings, obesity, diabetes, kidney disease, family history, pregnancy history, and service access while preserving periodic population-wide opportunities. Second, procure independently validated upper-arm monitors with a cuff-size portfolio. Third, train through demonstration and teach-back, with competency checks. Fourth, use a structured measurement schedule and automatic averaging where possible.Fifth, apply a confirmation and urgent-referral algorithm. Sixth, link confirmed patients to standardized risk assessment, affordable medicines, and titration. Seventh, track the complete cascade from invitation to control, including equity. Eighth, maintain devices and refresh training. Failure at any function reduces impact. Device distribution should therefore be reported as an input, not a health outcome.Core indicators should include invited adults; adults trained; valid structured home series completed; positive screens; confirmed hypertension; median time to confirmation; treatment initiation; control at six and 12 months; device failure; training competency; family-member reach; and cost per additional controlled patient. Indicators should be disaggregated by sex, age, disability, socioeconomic group, and remoteness.Scale-up should proceed adaptively. States can pilot alternative ownership and data models, compare them using common measures, and expand those that achieve confirmed detection and control without widening disparities. Continuous quality-improvement cycles should review false alarms, missed follow-up, cuff problems, medicine stock-outs, and user feedback. The programme goal is prevented cardiovascular harm, not a high volume of home readings.

15. RESEARCH AGENDA

The next phase of Indian research should answer five questions. Which device-access model produces the lowest cost per confirmed and controlled patient? What training intensity maintains accurate technique over time? Which confirmation schedule balances sensitivity, specificity, burden, and feasibility? How should home averages be integrated with total cardiovascular risk and treatment protocols? Which populations benefit most and which require assisted monitoring?Longer pragmatic trials should measure sustained pressure control, medication intensification, adherence, quality of life, anxiety, health-service use, kidney and cardiovascular outcomes, and equity. Calibration studies should include diverse arm sizes, arrhythmias, pregnancy, older age, and multiple Indian regions. Cuffless technologies should be independently validated against accepted standards before diagnostic use.Household spillovers deserve dedicated cluster trials. Device-sharing networks can be mapped to understand reach and contamination. Implementation studies should include procurement, repair, data governance, and workforce impact. Economic models should use Indian event rates, costs, and treatment cascades rather than transferring foreign assumptions. Patient and frontline-worker co-design should precede large procurement.

15.1. POLICY SAFEGUARDS FOR RESPONSIBLE EXPANSION

Any large procurement programme should establish an independent technical committee that separates clinical validation from commercial claims. Tender documents should list accepted validation protocols, required cuff sizes, warranty terms, repair times, accuracy checks, data-export requirements, cybersecurity responsibilities, and procedures for product recall. Samples from each procurement lot should be checked before distribution. Frontline programmes should have a simple mechanism for reporting implausible values, damaged cuffs, battery problems, or repeated error codes. Without these safeguards, apparently inexpensive devices can create costly misclassification and weaken confidence in public services.Clinical governance should specify who reviews abnormal home averages, how quickly review occurs, which worker may confirm or refer, and which clinician may initiate or titrate treatment. Written escalation rules are particularly important when readings exceed 180/120 mmHg, when severe hypertension accompanies chest pain, breathlessness, neurological symptoms, visual disturbance, confusion, or pregnancy, and when hypotension or dizziness develops during treatment. Community education must distinguish an urgent reading from an emergency with symptoms while avoiding panic over every isolated elevation.Responsible expansion also requires a learning system. State and district teams should periodically compare home devices with calibrated reference devices, observe technique, audit a sample of logs, trace screen-positive participants, and review delays between detection and treatment. Patient complaints and non-use should be treated as quality data. Annual public reporting can show how many devices were distributed, but the more meaningful indicators are valid measurement completion, confirmation, treatment, sustained control, adverse events, and equitable reach. Independent evaluation should be protected from pressure to present distribution targets as health impact.Finally, communication should frame self-monitoring as supported self-care rather than transfer of responsibility from the health system to households. People can contribute high-quality information, but public services remain responsible for validation, diagnosis, affordable treatment, continuity, and protection of personal data. This social contract is essential for trust and for translating the EASE-BP detection advantage into durable cardiovascular benefit.

16. CONCLUSION

EASE-BP provides strong randomized evidence that home access to a validated blood-pressure monitor, supported by training and education, increases hypertension detection in a rural Indian primary-care setting. The effect is clinically and programmatically important: 25% versus 11% detection under a common standard threshold, with an even larger difference when the home threshold was used. Family-member detection suggests that benefits can extend beyond randomized individuals.The trial does not show that device provision alone is sufficient to control blood pressure. Its more nuanced lesson is that self-monitoring is a powerful entry point into care when embedded in a complete pathway. Accurate measurement, repeated averages, confirmation, clinical response, medicine access, follow-up, and data governance determine whether detection becomes prevention.India should move from the question “Should people measure at home?” to “Which supported home-monitoring model produces equitable, confirmed detection and sustained control at an affordable cost?” Answering that question through pragmatic trials and adaptive implementation would turn EASE-BP from a successful local experiment into a scalable cardiovascular-prevention strategy.

AUTHOR CONTRIBUTION STATEMENT

Md. Abdul Kader: Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work, Drafting the work or reviewing it critically for important intellectual content; AND Final approval of the version to be published, and Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

ACKNOWLEDGEMENTS: No specific individuals, institutions, or organizations contributed additional support or assistance requiring formal acknowledgement for this study.

DECLARATIONS:

Funding: This research received no specific grant, financial support, or funding from any public, commercial, or non-profit organization.

Conflicts Of Interest: The authors declare that there are no conflicts of interest, financial or otherwise, that could have influenced the research, analysis, or interpretation of the findings presented in this article.

Data Availability: The datasets and information used in this study are publicly available from the sources cited within the article. No proprietary or restricted data were used.

Trial Registration: Trial registration is not applicable to this study, as it does not involve clinical trials, human participants, or experimental interventions.

Generative AI Disclosure: Generative artificial intelligence tools were not used for generating research data, conducting analyses, or producing scientific conclusions in this study. The authors take full responsibility for the content and accuracy of the manuscript.

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Supplemental Material

No supplementary files, datasets, figures, or additional materials are associated with this study. Any information necessary to understand and evaluate the work is included in the main article.