International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
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+15878858911
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ARTICLE TITLE	POINT-OF-CARE TESTING AS AN INNOVATIVE APPROACH TO CHRONIC KIDNEY DISEASE IDENTIFICATION: SYSTEMATIC REVIEW
DOI	https://doi.org/10.31435/ijitss.2(50).2026.5526
RECEIVED	16 March 2026
ACCEPTED	15 June 2026
PUBLISHED	30 June 2026
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POINT-OF-CARE TESTING AS AN INNOVATIVE APPROACH TO CHRONIC KIDNEY DISEASE IDENTIFICATION: SYSTEMATIC REVIEW

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ABSTRACT

Introduction. Chronic kidney disease (CKD) is often underdiagnosed, especially in high-risk populations, despite its major clinical and public health significance. Point-of-care testing (POCT) may improve access to kidney function assessment and support earlier identification of CKD in community and primary care settings. Because current evidence is diverse and fragmented, this systematic review evaluates the role of POCT as an innovative approach to CKD identification.
Methods. A systematic review was conducted in accordance with PRISMA 2020 guidelines. PubMed/Medline and EMBASE were searched for articles published between 2006 and 2026 using terms related to point-of-care testing and chronic kidney disease. A total of 27 records were identified and screened by title and abstract. Studies relevant to the use of POCT in CKD identification were included in the qualitative analysis.
Results. Thirteen studies were included. The findings suggest that point-of-care testing can support early detection of chronic kidney disease, especially in high-risk and underserved populations. Creatinine-based eGFR and albuminuria tests were the most commonly used approaches. Several studies reported detection of previously unrecognized CKD, although diagnostic performance varied across settings and test types.
Conclusion. Point-of-care testing may support earlier identification of chronic kidney disease, especially in high-risk and underserved populations. The reviewed studies suggest that POCT can improve access to screening in community and resource-limited settings. However, further research is needed to standardize its use and confirm its long-term clinical value.

KEYWORDS

Chronic Kidney Disease, Point-of-Care Testing, Albuminuria, Estimated Glomerular Filtration Rate

CITATION

Klaudia Magdalena Kotlarska, Wojciech Kotlarski, Tomasz Stanisław Mainka, Emil Sergejuk. (2026) Point-of-Care Testing as an Innovative Approach to Chronic Kidney Disease Identification: Systematic Review. *International Journal of Innovative Technologies in Social Science*. 2(50). doi: 10.31435/ijitss.2(50).2026.5526

Introduction

Chronic kidney disease (CKD) is an important and increasingly recognized public health problem because it often develops gradually and remains undetected until kidney damage is already advanced (1,2). In routine practice, many individuals with impaired kidney function are diagnosed late, despite the presence of well-known risk factors such as diabetes, hypertension, obesity, cardiovascular disease, and social or geographic barriers to care (3). Delayed identification of CKD limits the opportunity for early intervention, risk-factor control, and prevention of further renal decline. For this reason, improving strategies for earlier recognition of CKD has become a relevant clinical, public health, and health-system priority (4,5). This issue is particularly important because CKD is associated not only with progression to kidney failure, but also with an increased risk of cardiovascular complications, reduced quality of life, and higher healthcare utilization. In many patients, kidney dysfunction is first identified only after the onset of clinically significant abnormalities, which means that the earlier phases of disease remain insufficiently recognized in routine care. As a result, there is growing interest in screening models that are more accessible, faster, and easier to implement outside traditional specialist settings (3,4).

Conventional CKD detection is usually based on laboratory assessment of serum creatinine, estimated glomerular filtration rate (eGFR), and albuminuria. Although these markers are well established, their use in everyday care is often inconsistent, especially in people who are at high risk but are not regularly monitored (6). Poor adherence to albuminuria testing recommendations in patients with diabetes illustrates an important gap between clinical guidelines and real-world practice (7). In addition, the need for centralized laboratory infrastructure, repeated visits, and delayed availability of results may reduce the effectiveness of early case finding, particularly in underserved communities, primary care environments, and outreach settings (8). These limitations are especially relevant in settings where access to nephrology services is restricted and where preventive testing must compete with other urgent healthcare needs. Even when standard laboratory methods are available, they may not always be integrated effectively into early screening pathways, which contributes to missed opportunities for timely CKD recognition. This creates a need for more practical models of testing that can function closer to the patient and support earlier clinical response (6,8).

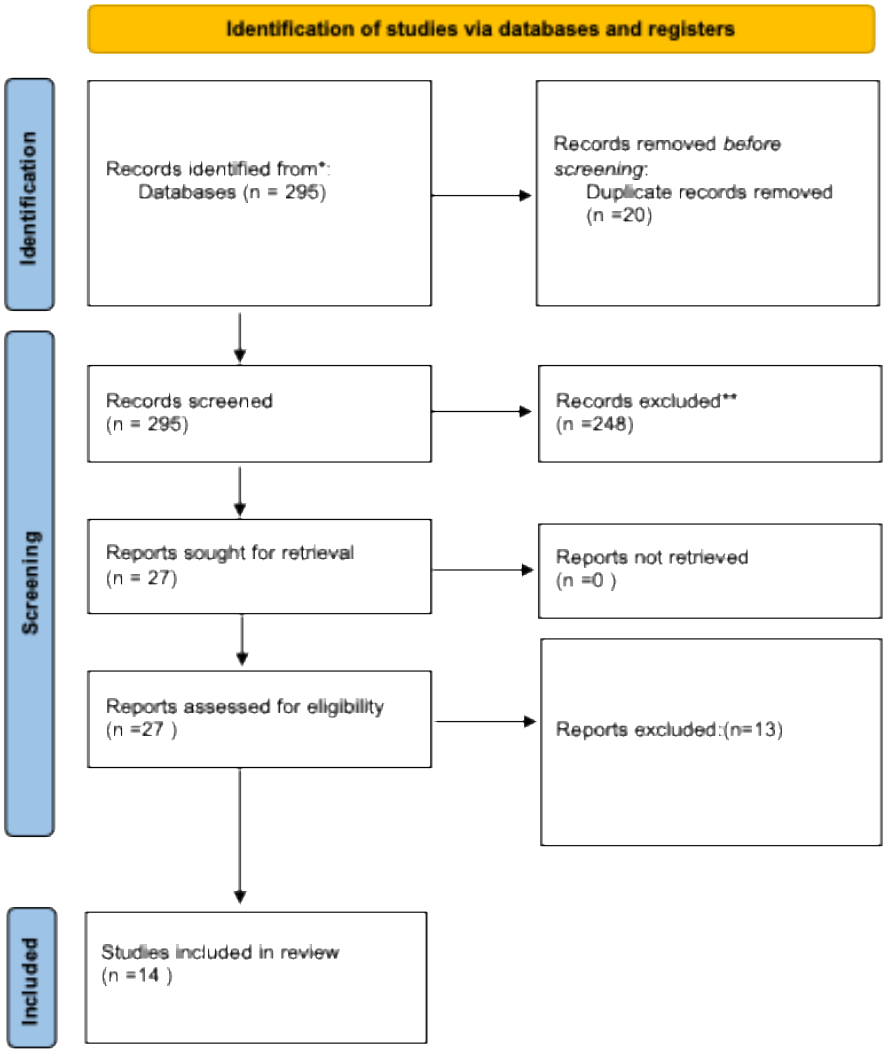
In this context, point-of-care testing (POCT) has emerged as a potentially valuable and innovative approach to CKD identification. By enabling selected kidney-related measurements to be performed near the patient rather than exclusively in centralized laboratories, POCT may shorten the time to results, support immediate clinical decisions, and expand access to testing in community, workplace, pharmacy, rural, and primary care settings.(9,10) This approach may be particularly useful in high-risk populations and in environments where conventional diagnostic pathways are less accessible or less efficient (11,12). Recent studies have explored POCT for creatinine-based eGFR assessment, albuminuria detection, and integrated community-based kidney health initiatives, suggesting that such tools may improve the practicality of earlier CKD recognition (10,3). Importantly, the potential value of POCT extends beyond analytical speed alone. In several screening models, point-of-care approaches have been linked with targeted case finding, community engagement, and improved access for populations that might otherwise remain untested. This is particularly relevant in Indigenous communities, among people living with HIV, and in rural or socially disadvantaged populations, where earlier CKD recognition may have both clinical and public health benefits (3,11). POCT may therefore be viewed not only as a diagnostic technology, but also as part of a broader effort to make CKD screening more accessible, more decentralized, and more responsive to real-world barriers in care delivery (9,12).

Available studies differ in terms of study design, target population, type of POCT device, biomarkers assessed, implementation setting, and outcomes of interest. Some reports focus on diagnostic performance, while others emphasize feasibility, workflow integration, accessibility, or community engagement. Moreover, evidence comes from diverse contexts, including people living with HIV, Indigenous communities, community pharmacy services, and population-based screening programs, which makes it difficult to form a clear overall conclusion without structured synthesis.(6) This variability highlights the need for a systematic review that not only summarizes diagnostic findings, but also examines the broader practical and social relevance of POCT in CKD identification (13).

Therefore, this systematic review aims to evaluate point-of-care testing as an innovative approach to chronic kidney disease identification. The review focuses on the diagnostic and practical role of POCT in detecting CKD or CKD-related abnormalities, with particular attention to its application in at-risk populations and non-traditional care settings. The review seeks to provide a transparent synthesis of the available evidence and to clarify the potential clinical and public health value of POCT in earlier CKD recognition.

Material and Methods

The data for this analysis were selected using the PRISMA 2020 flow diagram. A systematic literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. PubMed/Medline and EMBASE were searched for articles published between 2006 and 2026. The search strategy included terms related to point-of-care testing and chronic kidney disease, including "point-of-care testing", "point-of-care technology", POCT, "chronic kidney disease", CKD, "kidney disease", "renal disease", screening, detection, and identification.



A total of 27 articles were identified. The retrieved records were screened according to their titles and abstracts. Studies relevant to the objective of the review were selected for qualitative analysis, while articles unrelated to CKD identification, not involving POCT, or not matching the review topic were excluded.

Results

The following studies formed the basis of the analisys:

1. Galbraith LE, Ronksley PE, Barnieh LJ, Kappel J, Manns BJ, Samuel SM, Jun M, Weaver R, Valk N, Hemmelgarn BR. The See Kidney Disease Targeted Screening Program for CKD. Clin J Am Soc Nephrol. 2016 Jun 6;11(6):964-972. doi: 10.2215/CJN.11961115. Epub 2016 May 19. PMID: 27197905; PMCID: PMC4891759 (14).

2. Ferguson TW, Tangri N, Tan Z, James MT, Lavallee BDA, Chartrand CD, McLeod LL, Dart AB, Rigatto C, Komenda PVJ. Screening for chronic kidney disease in Canadian indigenous peoples is cost-effective. Kidney Int. 2017 Jul;92(1):192-200. doi: 10.1016/j.kint.2017.02.022. Epub 2017 Apr 20. PMID: 28433383 (15).

3. Mathew TH, Corso O, Ludlow M, Boyle A, Cass A, Chadban SJ, Joyner B, Shephard M, Usherwood T. Screening for chronic kidney disease in Australia: a pilot study in the community and workplace. Kidney Int Suppl. 2010 Mar;(116):S9-16. doi: 10.1038/ki.2009.538. PMID: 20186177.

4. Donovan J, Al Hamarneh YN, Bajorek B, Papastergiou J, Tsuyuki RT. Community pharmacist identification of chronic kidney disease using point-of-care technology: A pilot study. Can Pharm J (Ott). 2020 Feb 13;153(2):84-87. doi: 10.1177/1715163520902495. PMID: 32206152; PMCID: PMC7079322 (9).

5. Tafuna'i M, Turner R, Matalavea B, Voss D, Hazelman L, Richards R, Walker R. Results of a community-based screening programme for chronic kidney disease and associated risk factors, (obesity, diabetes and hypertension) in a Samoan cohort. BMJ Open. 2022 Apr 8;12(4):e056889. doi: 10.1136/bmjopen-2021-056889. PMID: 35396298; PMCID: PMC8996012 (2).

6. Currin SD, Gondwe MS, Mayindi NB, Chipungu S, Khoza BL, Tollman S, Fabian J, George JA; ARK Consortium. Diagnostic accuracy of semiquantitative point of care urine albumin to creatinine ratio and urine dipstick analysis in a primary care resource limited setting in South Africa. BMC Nephrol. 2021 Mar 20;22(1):103. doi: 10.1186/s12882-021-02290-5. PMID: 33743616; PMCID: PMC7981803.

7. Vutthikraivit N, Kiatamornrak P, Boonkrai C, Pisitkun T, Komolpis K, Puthong S, Lumlertgul N, Peerapornratana S, Thanawattano C, Tungsanga S, Praditpornsilpa K, Tungsanga K, Eiam-Ong S, Srisawat N. Development and validation of point-of-care testing of albuminuria for early screening of chronic kidney disease. J Clin Lab Anal. 2021 Apr;35(4):e23729. doi: 10.1002/jcla.23729. Epub 2021 Feb 16. PMID: 33590941; PMCID: PMC8059747 (16).

8. Nasuuna EM, Kalyesubula R, Tomlinson LA, Castelnuovo B, Okello E, Dziva Chikwari C, Weiss HA. Diagnostic performance of an albuminuria point-of-care test in screening for chronic kidney disease among young people living with HIV in Uganda: a cross-sectional study. BMJ Open. 2024 Aug 17;14(8):e083221. doi: 10.1136/bmjopen-2023-083221. PMID: 39153770; PMCID: PMC11331864 (7).

9. Dally M, Amador JJ, Butler-Dawson J, Lopez-Pilarte D, Gero A, Krisher L, Cruz A, Pilloni D, Kupferman J, Friedman DJ, Griffin BR, Newman LS, Brooks DR. Point-of-Care Testing in Chronic Kidney Disease of Non-Traditional Origin: Considerations for Clinical, Epidemiological, and Health Surveillance Research and Practice. Ann Glob Health. 2023 Feb 1;89(1):7. doi: 10.5334/aogh.3884. PMID: 36789382; PMCID: PMC9896998.

10. Chinta RK, Shri V, Milojkovic B, Begos D, Kemisetti S, Chintagunti NK, Bikbov B; FOCUS-CKD (Frontline Optimization and Comprehensive Upgradation of Services in Chronic Kidney Disease) Project. Point-of-Care Testing and Integrated Digital Health Technology for CKD Screening in High-Risk Populations of India. Kidney Int Rep. 2025 Apr 21;10(7):2128-2139. doi: 10.1016/j.ekir.2025.04.014. Erratum in: Kidney Int Rep. 2025 Jul 01;10(9):3296. doi: 10.1016/j.ekir.2025.07.001. PMID: 40677348; PMCID: PMC12266205 (18).

11. Msilanga D, Muiru A, Msangi E, Shoo J, Mngumi J, Komba E, Balandya E, Ruggajo P, Bhimma R, Liu K. Point-of-care creatinine-based eGFR (StatSensor) in detecting kidney dysfunction (KD) among people living with HIV in Tanzania. PLoS One. 2025 Sep 11;20(9):e0331969. doi: 10.1371/journal.pone.0331969. PMID: 40934196; PMCID: PMC12425315.

12. Korsa A, Krass I, Van C, Tesfaye W, Gisev N, Tran A, McMorrow R, Robson B, Fethney J, Versace V, Sud K, Kairaitis L, Johnson D, Mullan J, Vagholkar S, Castelino RL. Australian pharmacists' experiences and perspectives in implementing a chronic kidney disease screening service in community pharmacies: A qualitative study. Explor Res Clin Soc Pharm. 2025 Aug 21;20:100643. doi: 10.1016/j.rcsop.2025.100643. PMID: 40918413; PMCID: PMC12408408.

13.Jeemon P., Ismail S., Kondeth H., Prasanna R.V., Valamparampil M.J., Thulaseedharan J.V., Gopala S. (2026). CKD in Indigenous Populations in Kerala, India. Kidney International Reports, 11(1), 76-85. http://dx-1doi-1org-1000003vk0169.han3.wum.edu.pl/10.1016/j.ekir.2025.10.015

14.Gama RM, Griffiths K, Beencke N, Dalrymple K, Mitchell S, Ravi P, Mayhew J, Greenwood S, Bramham K. A pilot point-of-care kidney disease clinic in primary care to pharmacologically optimise people with chronic kidney disease (PROTECT KIDNEY). Fam Pract. 2025 Oct 21;42(6):cmaf083. doi: 10.1093/fampra/cmaf083. PMID: 41165433; PMCID: PMC12573251.

The following thirteen articles were included in the final analysis. The studies differed in design, target population, and screening setting, but together they provided a broad overview of how point-of-care testing can support the early identification of chronic kidney disease in community, primary care, pharmacy-based, and resource-limited environments. Across the included literature, point-of-care strategies were used mainly for creatinine-based eGFR assessment, albuminuria detection, or combined multidimensional screening pathways integrating blood, urine, and cardiovascular risk measurements. The findings consistently suggested that POCT may improve access to earlier kidney disease recognition, especially in populations with limited laboratory access or a high burden of undiagnosed disease (14). The reviewed studies also reflected the broad practical scope of POCT, ranging from diagnostic accuracy assessments to community-based implementation models and targeted screening initiatives. Although the methodological approaches were not uniform, the overall evidence showed that point-of-care strategies were most often evaluated as tools for improving accessibility, accelerating initial assessment, and supporting earlier identification of individuals who might otherwise remain undiagnosed within conventional care pathways (17,19).

Galbraith et al. evaluated the See Kidney Disease Targeted Screening Program for CKD, a large Canadian initiative designed to identify previously unrecognized kidney disease in adults with known risk factors. The program used point-of-care creatinine testing and eGFR calculation in participants attending screening events across Canada. Among 6,329 participants, the vast majority reported at least one CKD risk factor, and 92.3% of those at risk underwent screening. Unrecognized CKD was detected in 18.8% of screened individuals, with stage 3a disease representing the largest subgroup. Importantly, individual-targeted events identified a higher proportion of undiagnosed CKD than broader community-targeted events. This study strongly supports the value of targeted POCT-based screening, showing that focused outreach toward high-risk adults yields clinically relevant detection rates and may be more efficient than less selective public screening approaches (14).

Ferguson et al. approached CKD identification from a health systems perspective and examined whether screening high-risk Indigenous populations in rural Canada with point-of-care testing could be economically justified. It remains highly relevant to the present review because it linked POCT-based CKD detection with downstream treatment, prevention of kidney failure, and long-term resource use. The authors concluded that targeted screening and treatment using point-of-care equipment was cost-effective, particularly in remote communities accessible only by air, where the burden of kidney disease is high and standard laboratory access is more limited. These findings broaden the interpretation of innovation in CKD screening by showing that POCT is not only clinically useful but may also be economically defensible when implemented in geographically underserved populations (15).

Mathew et al. described the Australian Kidney Evaluation for You (KEY) pilot, which screened high-risk adults in community and workplace settings. The program used a point-of-care model that included on-site assessment of eGFR, albuminuria, hemoglobin A1c, cholesterol, hemoglobin, and lifestyle-related risk factors. The study was notable because it framed CKD screening as part of a broader preventive health strategy rather than as an isolated nephrology intervention. The authors reported strong community and professional support, and nearly all participants considered the screening beneficial. It illustrates how POCT can be embedded in accessible, non-hospital environments and combined with immediate counselling, referral, and follow-up advice, thereby increasing the practical reach of early CKD identification (1).

Donovan et al. assessed whether community pharmacists could use point-of-care creatinine testing to identify CKD in routine pharmacy practice. In this 6-week pilot study conducted in Ontario, 108 individuals were approached and 89 consented to participate. Screening was performed with the StatSensor device, and CKD was defined as an eGFR below 60 mL/min/1.73 m^2. More than one in ten participants met criteria for CKD, and 90% of these cases had been previously unrecognized. The study therefore demonstrated two important points: first, pharmacy-based POCT screening was feasible in a real-world outpatient setting, and second, a considerable proportion of high-risk patients with impaired kidney function had not been identified

before screening. This makes the study particularly relevant to the concept of innovative decentralization of kidney disease detection (9).

Tafuna'i et al. presented findings from a large community-based screening programme in Samoa, where 1,163 adults self-referred to screening sites located in both urban and rural settings. Participants underwent point-of-care serum creatinine testing, eGFR calculation, urine dipstick testing, and assessment of obesity, diabetes, and hypertension, including point-of-care HbA1c. The reported prevalence of CKD grades 1–5 was 44.5%, with stage 3 CKD accounting for the largest share. At the same time, obesity, diabetes, and hypertension were all highly prevalent. This study did not test a single device in isolation, but it provided strong evidence that POCT-based multidomain screening can reveal a substantial hidden burden of kidney disease in communities where epidemiologic data are scarce. It also highlighted the close overlap between CKD and cardiometabolic risk factors, supporting the usefulness of integrated screening strategies rather than kidney-focused testing alone (2).

Currin et al. focused on the diagnostic accuracy of a semiquantitative point-of-care urine albumin-to-creatinine ratio system in a rural primary care setting in South Africa. In 700 screened participants, albuminuria prevalence was 11.6%, and those with albuminuria were more likely to have higher blood pressure and diabetes. The point-of-care ACR system showed a sensitivity of 0.79 and specificity of 0.84, while its negative predictive value reached 0.97. Diagnostic performance was even better in certain subgroups, including people with elevated blood pressure, diabetes, HIV infection, and older age. The authors concluded that the test may be particularly useful for ruling out albuminuria during CKD screening. This study adds important diagnostic depth to the present review because it suggests that even when POCT is not perfect for confirmation, it may still be highly valuable as an initial triage tool in low-resource screening pathways (6).

Vutthikraivit et al. investigated the development and validation of an antibody-based point-of-care test for albuminuria intended for early CKD screening. The study was conducted in Thailand and compared the newly developed urine strip against standard laboratory methods as well as existing commercial POCT products. The work is particularly relevant to the innovative technology profile of the journal because it moved beyond simple implementation and addressed actual device development and validation. Rather than relying exclusively on conventional laboratory infrastructure, the authors proposed a lateral-flow immunochromatographic approach that could support rapid and lower-cost identification of early kidney damage. This article therefore contributes a technological dimension to the present review, emphasizing that POCT in CKD is not limited to relocating standard tests but also includes the design of novel, simplified diagnostic platforms for earlier case finding (16).

Nasuuna et al. examined the performance of an albuminuria point-of-care test among young people living with HIV in Uganda. In this cross-sectional study of 497 participants, the test was compared with laboratory-measured urine albumin and creatinine. Sensitivity was 74.5% and specificity was 68.1%, while positive predictive value was low at 21.5%. However, the negative predictive value was high at 95.8%, and overall accuracy reached 68.8%. The authors concluded that the test was not sufficiently strong as a stand-alone confirmatory tool, but it may still be useful for excluding kidney disease in screening contexts. This study is valuable because it introduces nuance into the literature: not all POCT strategies perform equally well, and clinical usefulness may depend on whether the goal is case confirmation or safe rule-out. Such findings are especially important in vulnerable populations, where screening pathways must balance accessibility with diagnostic reliability (7).

Dally et al. addressed point-of-care testing in chronic kidney disease of non-traditional origin, with particular attention to use in epidemiological, clinical, and surveillance settings. Although this article was more methodological than interventional, it was relevant because it assessed the role of point-of-care creatinine devices in environments where conventional laboratory access is constrained. The paper emphasized that POCT may be especially useful in resource-limited areas, but that device selection should depend on the intended use-case and the required balance between portability, performance, and field conditions. In the context of the present review, this study is important because it shows that innovation in CKD screening is not only about detecting disease in established healthcare systems, but also about adapting diagnostic strategies to difficult environments and distinct disease patterns (17).

Chinta et al. evaluated a pilot programme combining point-of-care testing with digital health technology for CKD screening in high-risk populations in India. The study is particularly notable because it linked screening not only with rapid testing but also with structured digital data capture and clinical workflow support. The authors reported very low baseline awareness of CKD in both urban high-risk populations and rural CKD hotspot communities, despite a substantial burden of risk factors. They concluded that POCT integrated with

digital health tools enabled identification of CKD in these high-risk groups and should be scaled up to promote earlier diagnosis and better clinical management. This paper is one of the clearest examples of how innovation in kidney screening can extend beyond the test itself and include digital systems that improve linkage between diagnosis, documentation, and follow-up care (18).

Msilanga et al. assessed the diagnostic performance of the StatSensor point-of-care creatinine system for detecting kidney dysfunction among people living with HIV in Tanzania. In 358 participants, 15.6% had kidney dysfunction defined as eGFR below 60 mL/min/1.73 m². Compared with the laboratory Jaffe method, the StatSensor demonstrated a sensitivity of 92.9%, specificity of 94.7%, and overall diagnostic accuracy of 94.4%, with an AUC of 0.938 and substantial agreement between methods. Although Bland-Altman analysis showed some bias, the overall concordance was strong. Among all studies included in this review, this was one of the clearest demonstrations that creatinine-based POCT can achieve high diagnostic performance in a resource-limited setting. It therefore supports the idea that real-time kidney function screening can be both practical and clinically dependable outside centralized laboratories (10).

Korsa et al. explored pharmacists' experiences with implementing a chronic kidney disease screening service in Australian community pharmacies. This qualitative study did not primarily measure diagnostic accuracy, but it added an important implementation perspective to the current review. Pharmacists generally described the service positively and identified several facilitators of successful delivery, including training, available resources, team-based workflow, and patient acceptance. At the same time, they reported barriers such as time pressure, staffing limitations, documentation issues, and challenges in communication with general practitioners. This study is useful for Results because it explains why promising POCT models may succeed or fail in practice. In other words, it complements the more quantitative studies by showing that technical feasibility alone is not enough; sustainability depends on workforce structure, reimbursement, and interprofessional integration (11).

Jeemon et al. investigated CKD in Indigenous populations in Kerala, India, using a community-based design that incorporated point-of-care blood testing and spot urine analysis. Among 2,029 adults aged 30 years or older from 18 tribal communities, the prevalence of CKD was 22.6%, with most cases located in earlier risk categories. CKD was associated with older age, hypertension, diabetes, lower educational attainment, and low body mass index. Although this paper was broader than a pure device-validation study, it is highly relevant because it shows how POCT-enabled field screening can uncover a substantial subclinical burden of disease in marginalized populations that are often underrepresented in conventional nephrology pathways. The study also reinforces the idea that kidney screening programmes must be adapted to social and cultural context, especially when serving communities with health inequities and limited access to routine care (3).

Finally, Gama et al. evaluated a point-of-care kidney clinic model in primary care designed to optimize pharmacological treatment in adults with proteinuric CKD. Although the focus extended beyond initial detection, the study remains relevant because it used point-of-care creatinine and potassium testing to support immediate clinical decisions in community settings. Of 48 identified patients, 25 agreed to participate, 92% completed the pathway, and 80% achieved pharmacological optimization without significant adverse events. POCT was successful in most encounters and patient satisfaction was high. This study suggests that the value of POCT in CKD may continue beyond screening itself, enabling faster therapeutic action once kidney disease is recognized. In that sense, it supports a broader interpretation of innovation in CKD care: point-of-care approaches can help close the gap between diagnosis and treatment in routine primary care (19).

Taken together, the included studies indicate that point-of-care testing has meaningful potential to improve CKD identification across a wide range of settings. The strongest evidence was seen in targeted screening programmes, creatinine-based eGFR assessment, and albuminuria rule-out strategies used in high-risk or underserved populations. At the same time, the reviewed literature showed that POCT performance varies by device, marker, and population, and that implementation success depends not only on analytical performance but also on workflow integration, staffing, referral pathways, and patient acceptability. Overall, the available evidence supports POCT as a promising and increasingly practical component of early CKD detection strategies, particularly where standard laboratory infrastructure is limited or delayed (14,18).

Discussion:

The findings of this systematic review suggest that point-of-care testing may be a useful and innovative approach to the early identification of chronic kidney disease, particularly in high-risk and underserved populations. Across the included studies, POCT was applied in community, pharmacy-based, primary care, and resource-limited settings, showing that CKD screening can be extended beyond traditional laboratory-centered pathways. This is especially important because chronic kidney disease often remains asymptomatic in its early stages and may therefore be diagnosed too late for optimal preventive intervention (1,18).

A consistent observation across the reviewed studies is that POCT appears to be most effective when used in **targeted screening programmes**. Higher detection rates were reported in populations with known risk factors such as diabetes, hypertension, cardiovascular disease, HIV infection, and limited access to routine healthcare. This suggests that the value of POCT depends not only on test performance, but also on the selection of the screened population. In practice, point-of-care approaches seem to be most beneficial when integrated into risk-based screening models rather than used indiscriminately (9,15).

The reviewed studies mainly assessed two diagnostic approaches: **creatinine-based eGFR testing** and **albuminuria-focused testing.** Creatinine-based POCT showed promising utility for rapid kidney function assessment, while albuminuria tests appeared particularly relevant for early screening. However, the diagnostic performance of albuminuria-based methods was more variable, indicating that some POCT tools may be more appropriate for initial screening or triage than for definitive diagnosis. For this reason, POCT should be considered a supportive component of the diagnostic pathway rather than a full replacement for standard laboratory testing (2,3).

An additional strength of POCT highlighted in the reviewed literature is its potential role in improving **diagnostic accessibility and equity**. In remote, rural, and socially disadvantaged populations, portable testing strategies may help reduce barriers to early CKD recognition. At the same time, successful implementation depends on more than analytical accuracy alone. Effective screening programmes also require staff training, appropriate workflow, clear referral pathways, and follow-up systems (6). This indicates that the success of POCT depends not only on the availability of testing devices, but also on how well they are integrated into routine models of care. (6,15)

Overall, the available evidence supports POCT as a promising tool for earlier CKD identification. Its main advantages include accessibility, rapid results, and adaptability to decentralized care settings. In addition, recent studies suggest that the continued development of novel POCT platforms may further increase the practical value of CKD screening, particularly in community-based and resource-limited environments. Newer technologies may improve usability, simplify testing procedures, and support broader implementation, although further comparative research is still needed to determine their clinical reliability and long-term usefulness (20). However, further studies are needed to better standardize screening models, compare different technologies, and determine whether POCT-based detection leads to improved long-term renal and cardiovascular outcomes (19).

Conclusions:

This systematic review indicates that point-of-care testing is a promising and innovative approach to the identification of chronic kidney disease, particularly in settings where traditional laboratory access is limited or delayed and in populations with a high burden of undiagnosed disease. Across the reviewed studies, POCT was used in community, pharmacy-based, primary care, and resource-limited screening models, showing that kidney disease detection does not need to be confined to hospital-centered diagnostic pathways. This is one of the most important practical implications of the current evidence. POCT allows screening to be shifted closer to the patient, which may improve accessibility, shorten the time to initial assessment, and increase the likelihood that high-risk individuals are tested at an earlier stage of disease (14).

The findings also suggest that the value of POCT is greatest when it is incorporated into **targeted screening strategies**. Studies focusing on people with diabetes, hypertension, HIV infection, cardiovascular risk, or limited healthcare access consistently showed that point-of-care approaches can reveal a substantial number of previously unrecognized CKD cases. This indicates that the usefulness of POCT depends not only on the technology itself but also on the way in which it is implemented. In this context, point-of-care testing should be understood primarily as a practical first-line identification tool that supports early case finding in populations where the probability of CKD is already increased (14).

At the same time, the evidence reviewed in this study shows that POCT should not be interpreted as a universal replacement for standard laboratory testing. The diagnostic value of point-of-care strategies varies

according to the biomarker measured, the device used, the clinical setting, and the purpose of testing. Creatinine-based eGFR assessment appears especially useful for rapid evaluation of kidney function, whereas albuminuria-oriented POCT may be valuable for early screening and triage but often still requires confirmation through standard laboratory methods. Therefore, the most realistic and clinically appropriate role of POCT is within a broader diagnostic pathway that includes confirmatory testing, referral when needed, and ongoing follow-up of patients identified as being at risk (6).

The reviewed literature further suggests that the future of CKD screening may depend not only on portable tests themselves but also on their integration with **digital health systems, community-centered care models, and structured implementation pathways**. Approaches that combine rapid testing with electronic data capture, risk stratification, and coordinated follow-up may offer the greatest practical benefit. Such models could improve not only disease detection but also continuity between screening and treatment initiation. This is particularly important in underserved communities, where the challenge is often not only to identify CKD but also to ensure that the diagnosis leads to appropriate clinical action (11).

In conclusion, point-of-care testing represents a flexible, socially relevant, and increasingly practical innovation in chronic kidney disease identification. When applied in high-risk populations and supported by effective referral and management pathways, it has the potential to improve earlier recognition of CKD and reduce diagnostic inequities. However, further high-quality research is still needed to standardize performance assessment, compare different screening strategies, and determine whether wider use of POCT leads to better long-term renal, cardiovascular, and health system outcomes. Despite these limitations, the available evidence supports POCT as an important and evolving component of modern CKD screening and early detection strategies (10).

REFERENCES

1. Mathew, T. H., Corso, O., Ludlow, M., Boyle, A., Cass, A., Chadban, S. J., Joyner, B., Shephard, M., & Usherwood, T. (2010). Screening for chronic kidney disease in Australia: A pilot study in the community and workplace. *Kidney International Supplements, 77*(116), S9–S16. https://doi.org/10.1038/ki.2009.538
2. Tafuna'i, M., Turner, R., Matalavea, B., Voss, D., Hazelman, L., Richards, R., & Walker, R. (2022). Results of a community-based screening programme for chronic kidney disease and associated risk factors (obesity, diabetes and hypertension) in a Samoan cohort. *BMJ Open, 12*(4), e056889. https://doi.org/10.1136/bmjopen-2021-056889
3. Jeemon, P., Ismail, S., Kondeth, H., Prasanna, R. V., Valamparampil, M. J., Thulaseedharan, J. V., & Gopala, S. (2026). CKD in Indigenous populations in Kerala, India. *Kidney International Reports, 11*(1), 76–85. https://doi.org/10.1016/j.ekir.2025.10.015
4. Pineda-Wieselberg, R. J., Crippa de Carvalho, A. C. B., Galastri, L. L., Kitamura, L. C. S., Alves, J., Rodrigues, C., Miranda, A. P., & Yoshimura, L. (2025). Assessment of chronic kidney disease risk factors in a community screening: Obesity, hypertension, and diabetes impact. *Diabetes Research and Clinical Practice*. Advance online publication. https://doi.org/10.1016/j.diabres.2025.112779
5. Frejuk, K. L., Harasemiw, O., Komenda, P., Lavallee, B., McLeod, L., Chartrand, C., Di Nella, M., Ferguson, T. W., Martin, H., Wicklow, B., & Dart, A. B. (2021). Impact of a screen, triage and treat program for identifying chronic disease risk in Indigenous children. *CMAJ, 193*(36), E1415–E1422. https://doi.org/10.1503/cmaj.210507
6. Currin, S. D., Gondwe, M. S., Mayindi, N. B., Chipungu, S., Khoza, B. L., Tollman, S., Fabian, J., George, J. A., & ARK Consortium. (2021). Diagnostic accuracy of semiquantitative point-of-care urine albumin-to-creatinine ratio and urine dipstick analysis in a primary care resource-limited setting in South Africa. *BMC Nephrology, 22*(1), 103. https://doi.org/10.1186/s12882-021-02290-5
7. Nasuuna, E. M., Kalyesubula, R., Tomlinson, L. A., Castelnuovo, B., Okello, E., Dziva Chikwari, C., & Weiss, H. A. (2024). Diagnostic performance of an albuminuria point-of-care test in screening for chronic kidney disease among young people living with HIV in Uganda: A cross-sectional study. *BMJ Open, 14*(8), e083221. https://doi.org/10.1136/bmjopen-2023-083221
8. McCormick, S. F., Ward, G. M., Trambas, C. M., & MacIsaac, R. J. (2025). A review of albuminuria testing rates in people with diabetes mellitus: Poor guideline adherence. *Pathology, 57*(7), 811–816. https://doi.org/10.1016/j.pathol.2025.08.002
9. Donovan, J., Al Hamarneh, Y. N., Bajorek, B., Papastergiou, J., & Tsuyuki, R. T. (2020). Community pharmacist identification of chronic kidney disease using point-of-care technology: A pilot study. *Canadian Pharmacists Journal/Revue des Pharmaciens du Canada, 153*(2), 84–87. https://doi.org/10.1177/1715163520902495
10. Msilanga, D., Muiru, A., Msangi, E., Shoo, J., Mngumi, J., Komba, E., Balandya, E., Ruggajo, P., Bhimma, R., & Liu, K. (2025). Point-of-care creatinine-based eGFR (StatSensor) in detecting kidney dysfunction among people living with HIV in Tanzania. *PLOS ONE, 20*(9), e0331969. https://doi.org/10.1371/journal.pone.0331969

11. Korsa, A., Krass, I., Van, C., Tesfaye, W., Gisev, N., Tran, A., McMorrow, R., Robson, B., Fethney, J., Versace, V., Sud, K., Kairaitis, L., Johnson, D., Mullan, J., Vagholkar, S., & Castelino, R. L. (2025). Australian pharmacists' experiences and perspectives in implementing a chronic kidney disease screening service in community pharmacies: A qualitative study. *Exploratory Research in Clinical and Social Pharmacy, 20*, 100643. https://doi.org/10.1016/j.rcsop.2025.100643
12. Malcolm, S., Cadet, J., Crompton, L., & DeGennaro, V., Jr. (2019). A model for point-of-care testing for non-communicable disease diagnosis in resource-limited countries. *Global Health, Epidemiology and Genomics, 4*, e7. https://doi.org/10.1017/gheg.2019.6
13. Chinta, R. K., Shri, V., Milojkovic, B., Begos, D., Kemisetti, S., Chintagunti, N. K., Bikbov, B., & FOCUS-CKD (Frontline Optimization and Comprehensive Upgradation of Services in Chronic Kidney Disease) Project. (2025). Point-of-care testing and integrated digital health technology for CKD screening in high-risk populations of India. *Kidney International Reports, 10*(7), 2128–2139. https://doi.org/10.1016/j.ekir.2025.04.014
14. Galbraith, L. E., Ronksley, P. E., Barnieh, L. J., Kappel, J., Manns, B. J., Samuel, S. M., Jun, M., Weaver, R., Valk, N., & Hemmelgarn, B. R. (2016). The See Kidney Disease targeted screening program for CKD. *Clinical Journal of the American Society of Nephrology, 11*(6), 964–972. https://doi.org/10.2215/CJN.11961115
15. Ferguson, T. W., Tangri, N., Tan, Z., James, M. T., Lavallee, B. D. A., Chartrand, C. D., McLeod, L. L., Dart, A. B., Rigatto, C., & Komenda, P. V. J. (2017). Screening for chronic kidney disease in Canadian Indigenous peoples is cost-effective. *Kidney International, 92*(1), 192–200. https://doi.org/10.1016/j.kint.2017.02.022
16. Vutthikraivit, N., Kiatamornrak, P., Boonkrai, C., Pisitkun, T., Komolpis, K., Puthong, S., Lumlertgul, N., Peerapornratana, S., Thanawattano, C., Tungsanga, S., Praditpornsilpa, K., Tungsanga, K., Eiam-Ong, S., & Srisawat, N. (2021). Development and validation of point-of-care testing of albuminuria for early screening of chronic kidney disease. *Journal of Clinical Laboratory Analysis, 35*(4), e23729. https://doi.org/10.1002/jcla.23729
17. Dally, M., Amador, J. J., Butler-Dawson, J., Lopez-Pilarte, D., Gero, A., Krisher, L., Cruz, A., Pilloni, D., Kupferman, J., Friedman, D. J., Griffin, B. R., Newman, L. S., & Brooks, D. R. (2023). Point-of-care testing in chronic kidney disease of non-traditional origin: Considerations for clinical, epidemiological, and health surveillance research and practice. *Annals of Global Health, 89*(1), 7. https://doi.org/10.5334/aogh.3884
18. Chinta, R. K., Shri, V., Milojkovic, B., Begos, D., Kemisetti, S., Chintagunti, N. K., Bikbov, B., & FOCUS-CKD (Frontline Optimization and Comprehensive Upgradation of Services in Chronic Kidney Disease) Project. (2025). Point-of-care testing and integrated digital health technology for CKD screening in high-risk populations of India. *Kidney International Reports, 10*(7), 2128–2139. https://doi.org/10.1016/j.ekir.2025.04.014
19. Gama, R. M., Griffiths, K., Beencke, N., Dalrymple, K., Mitchell, S., Ravi, P., Mayhew, J., Greenwood, S., & Bramham, K. (2025). A pilot point-of-care kidney disease clinic in primary care to pharmacologically optimise people with chronic kidney disease (PROTECT KIDNEY). *Family Practice, 42*(6), cmaf083. https://doi.org/10.1093/fampra/cmaf083