DOI:10.31557/APJCP.2026.27.3.877
Prostate Cancer Detection

RESEARCH ARTICLE

Editorial Process: Submission:06/01/2025 Acceptance:02/17/2026 Published:03/05/2026

The Impact of the Indonesian National Health Insurance Implementation on Prostate Cancer Detection, Staging, and Treatment in West Java Province, Indonesia

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Abstract

Background: This study aimed to evaluate the impact of National Health Insurance/ Jaminan Kesehatan Nasional (JKN) implementation on prostate cancer detection, staging, and treatment in West Java Province, Indonesia, with a focus on changes in prostate-specific antigen (PSA) testing accessibility. **Methods:** This cross-sectional study retrospectively analyzed medical records from Hasan Sadikin Hospital, a tertiary referral center, to compare prostate cancer cases between 2009-2013 (pre-JKN) and 2015-2019 (post-JKN). Data included age at diagnosis, PSA levels, Gleason grade, T and M stages, and treatment modalities. Additionally, a survey of urologists in West Java was conducted to assess PSA testing practices and JKN coverage. Statistical analyses were performed using Chi-square and Mann-Whitney U-tests. **Results:** Following JKN implementation, a significant increase in median PSA levels (from 29.275 ng/ml to 85.845 ng/ml, p=0.002) was observed. This was accompanied by a shift towards higher Gleason grade groups (p<0.001), more advanced T stages (p<0.001), and advanced M stages (p=0.003). The survey revealed limited PSA testing coverage under JKN, with only 18.75% of urologists reporting availability at their hospitals. **Conclusion:** Limited PSA testing following JKN implementation resulted in an increase in median PSA levels and a shift toward more advanced disease, suggesting an inability to detect prostate cancer at an early stage. These findings underscore the urgent need for targeted policy adjustments to enhance early detection, particularly in primary care settings.

Keywords: early detection- health insurance- Indonesia- prostatic neoplasms

Asian Pac J Cancer Prev, **27 (3)**, 877-882

Introduction

Indonesia is Lower-middle-income country with a population Reaching 260 million people. Similar to other low to middle-income country Indonesia faces significant challenges in the health sector. Like other low to a middle-income country, the proportion of disease in Indonesia is shifting from communicable disease to a non-communicable disease [1, 2]. Hence, Indonesia faces a double burden of the disease characterized by rising non-communicable diseases and a high incidence of communicable disease and must Develop a system that can provide prevention, long-term, and complex healthcare capable of tackling multimorbidity [2].

Starting in 2014 the Indonesian government implemented national health insurance, known as Jaminan Kesehatan Nasional (JKN), to make comprehensive care for all Indonesian. This system unites all major government health insurance that covers government officials also known as Asuransi Kesehatan (Askes), the labor force, Jaminan Sosial Tenaga Kerja (Jamsostek), low-income individuals or Jaminan Kesehatan Masyarakat (Jamkesmas) and province health insurance or Jaminan Kesehatan Daerah (Jamkesda), into one single agency the Social Security Management Corporation for the Health Sector also known as (BPJS Kesehatan). This system was designed to provide health insurance coverage for Indonesians who were previously excluded from government health insurance schemes prior to the implementation of BPJS Kesehatan, particularly individuals above the poverty line who remained vulnerable to impoverishment.

There are differences between the fragmented government health insurance policy and the national health insurance policy. One of the differences is the payment scheme which the amount depends on the level of health care facility. National health insurance used Indonesian Case Base Groups (INA CBGs) for payment scheme which limits hospitals' ability to provide certain service [3, 4].

The difference in payment scheme according to the level of health facility and the distance that the patient has to travel to the higher-level health facility, cause

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challenges in managing some disease. In the community health center (Puskesmas), the payment scheme of some specific laboratory examination and the diagnostic procedure is not sufficient. Thus, the patient has to progress to a higher-level health facility. The cost and the distance that the patient has to travel to the higher-level facility causes some patients to be reluctant to progress to the higher-level health facility.

One of the specific laboratory tests affected by the national health insurance policy is prostate-specific antigen (PSA). Under JKN, PSA testing cannot be examined at primary care or community health centers and requires referral to a higher-level (secondary or tertiary) hospital, which may contribute to delays in early prostate cancer detection.

This study aims to evaluate whether changes in national health insurance policy resulted in different consequences on prostate cancer detection, staging, and treatment in West Java.

Materials and Methods

Study Design

This is a cross-sectional study conducted from September 2024 to December 2024. The study aimed to evaluate the impact of the implementation of the Indonesian National Health Insurance on prostate cancer detection, staging, and treatment in West Java Province, Indonesia.

Data Collection

This study used two independent data sources: (1) medical records from Hasan Sadikin Hospital, which provided retrospective quantitative clinical data, and (2) survey data collected from practicing urologists in West Java, distributed using Google Forms, to obtain qualitative information on PSA testing availability, routine PSA use, biopsy practices, and insurance coverage variability across hospitals.

Secondary data were collected from Hasan Sadikin Hospital medical record, the tertiary referral national hospital in West Java. The study covering two distinct periods: before the implementation of JKN (2009–2013) and after its implementation (2015–2019). Cases from 2014 were excluded because this year represented a national transition period in the implementation of the JKN payment scheme. Hospitals were still adjusting administrative, billing, and referral systems during this period, resulting in inconsistent documentation and non-uniform care flow. Therefore, we considered this transition period not representative of either the pre-JKN or post-JKN eras. The variables that were collected from medical records: age at diagnosis, T and M stage, Gleason grade group, PSA level at the time of diagnosis, treatment modalities

A survey was conducted among urologists in West Java regarding current practices in PSA testing and prostate biopsy. Google forms were utilized to distribute and collect survey responses.

Study Population and Inclusion Criteria

The study population consisted of all patients diagnosed with prostate cancer at Hasan Sadikin Hospital during the specified periods. Inclusion criteria were: histopathological diagnosis of prostate cancer and availability of complete medical records with essential diagnostic and treatment data. Incomplete medical records were excluded from the study.

Survey of Urologists in West Java

A survey was distributed to 25 practicing urologists outside Hasan Sadikin Hospital, of whom 16 completed the questionnaire. The survey included questions on: Common diagnosis in daily practice, availability and routine use of PSA testing, PSA testing coverage under JKN in the physician region, frequency performing digital rectal examinations (DRE), modalities used to detect prostate cancer, prostate cancer staging at the time of detection, patient payment methods in physician clinical practice.

Statistical Analysis

Descriptive statistics were used to summarize patient characteristics, staging, and treatment patterns across the two study periods. Comparative analyses between pre- and post-JKN implementation data were conducted using the Chi-square ($\chi 2$) test for categorical variables and the Mann–Whitney U-test for continuous variables. A p-value of <0.05 was considered statistically significant.

Results

Patients characteristics in year 2009-2013 and 2015-2019 are presented in Table 1. Figure 1-4 represent the comparison of Gleason grade group, T stage, M stage and treatment received in prostate cancer cases between year 2009-2013 and 2015-2019. The questions list and response of urologist were recorded in Table 2.

Discussion

Indonesia's JKN implementation in 2014 aimed to improve access to healthcare and provide universal health coverage. This study sought to evaluate the impact of JKN on prostate cancer detection, staging, and treatment in West Java Province, Indonesia.

We found that the mean age of patients was lower before JKN implementation than after, but the difference was not statistically significant. However, a significant increase in median PSA levels has been noted since the implementation of JKN (Table 1). In this regard, it appears that the difficulty in accessing PSA testing influences

Table 1. Patient Characteristics

Variables	2009-2013	2015-2019	P-value
Number of patients (n)	125	105	N/A
Age (Mean ± SD)	66.06 ± 9.88	68.00 ± 9.10	0.259
PSA level (ng/ml)			0.002‡
Median	29,275	85,845	
Interquartile Range	118,705	644,230	

†Chi Square ($\chi 2$) test. ‡Mann–Whitney U-test

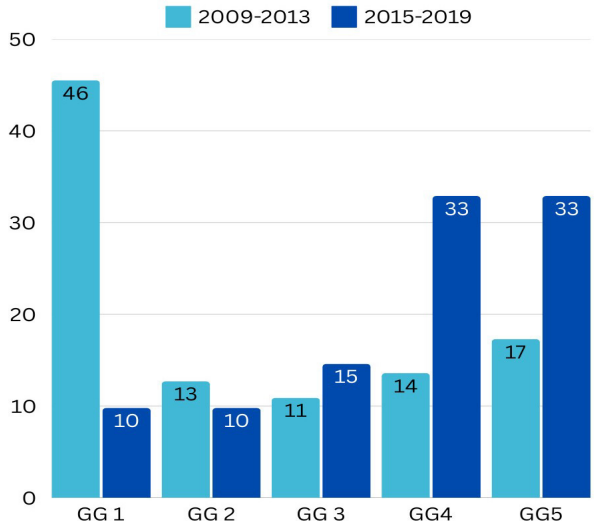

Figure 1. Gleason Group Comparison of Prostate Cancer Cases between 2009-2013 and 2015-2019. There is a significant difference in Gleason group between both periods (p<0.001).

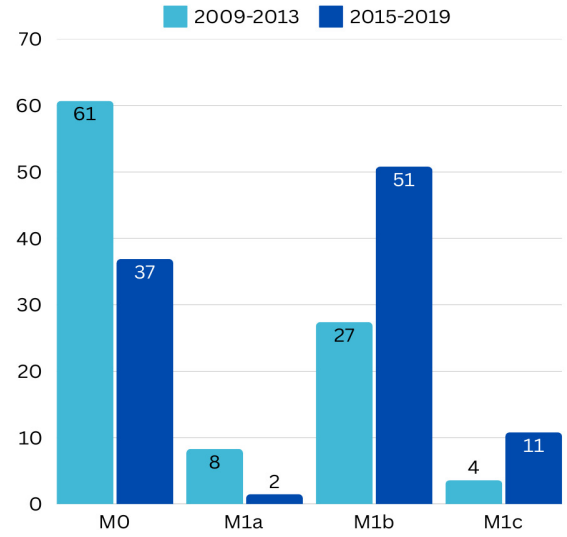

Figure 3. M Stage Comparison of Prostate Cancer Cases between 2009-2013 and 2015-2019. There is a significant difference in M stage between both periods (p=0.003).

prostate cancer behaviour. A higher median PSA in the post-JKN era indicates that patients are being diagnosed at more advanced stages of the disease, as indicated by higher Gleason group and more advanced T stages (Figure 1 and 2). Although PSA concentration tends to increase gradually with aging due to increasing prostate volume and BPH prevalence, our data demonstrated a disproportionate rise in PSA level in the post-JKN period relative to age difference. The mean age increased by only ~2 years between cohorts, yet the median PSA level increased almost threefold (from 29.3 ng/mL to 85.8 ng/mL). This suggests that limited access to PSA testing rather than age resulted in delayed diagnosis and more advanced disease at presentation in the post-JKN era.

A shift in the M stage is also observed. A higher M stage is noted in post-JKN periods is accompanied by a

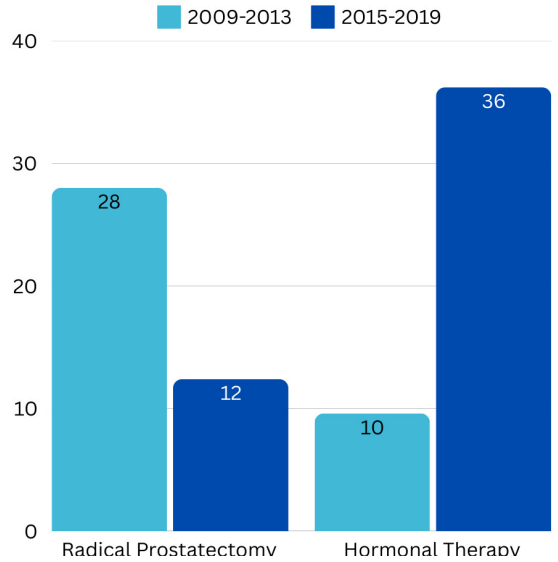

Figure 4. Treatment Comparison of Prostate Cancer Cases between 2009-2013 and 2015-2019. There is a significant difference in treatment between both periods (p=0.004).

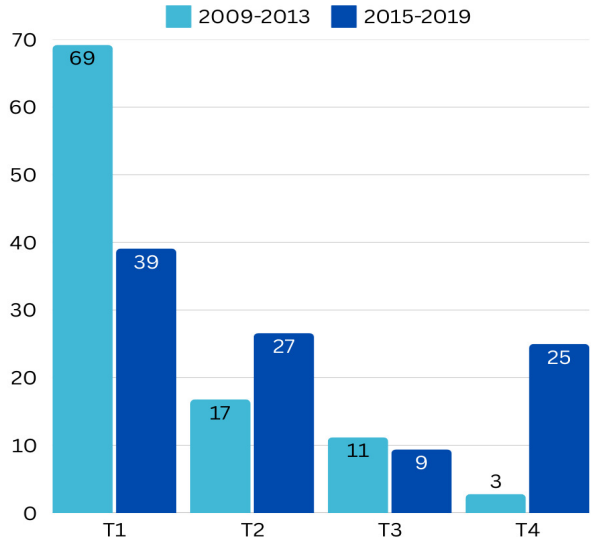

Figure 2. T Stage Comparison of Prostate Cancer Cases between 2009-2013 and 2015-2019. There is a significant difference in T stage between both periods (p<0.001).

lower radical prostatectomy performed in these periods (Figure 3 and 4). These findings align with the survey results, which indicate that PSA testing is not routinely performed in many regions of West Java, and its coverage under JKN is limited. Only 18.75% of urologists reported that PSA testing for JKN patients is covered by their hospitals, which may explain the delayed diagnosis and advanced staging observed in this study (Table 2).

Prostate-specific antigen (PSA) is a serine protease produced by prostatic epithelial cells and is widely used as a biomarker for prostate cancer screening and diagnostic evaluation [5]. Although elevated PSA levels may indicate malignancy, PSA is not cancer-specific. Several

Table 2. Questions List (Survey Data of West Java Urologist) [there is 25 urologists outside Hasan Sadikin hospital, 16 of whom completed the survey]

Questions	Response (n)	Percentage (%)
1.More than half male patients came to the clinic with:		
a. Urinary stone	2	12.5
b. LUTS/BPH	14	87.5
c. Urinary tract malignancy	0	0
d. Infertility	0	0
e. Others	0	0
2.Are Prostate Specific Antigen (PSA) available in your area?		
a. Yes	13	81.25
b. No	3	18.75
3.Are you routinely do PSA testing in Lower urinary tract/Benign prostatic enlargement (LUTS/BPO) patients?		
a. Yes	2	12.5
b. No	10	62.5
c. Sometimes	4	25
4.Are PSA testing for national insurance patients are covered by the hospital where you work?		
a. Yes	3	18.75
b. No	12	75
c. Not sure	1	6.25
5.Are you always doing digital rectal examination to evaluate prostate?		
a. Always	2	12.5
b. Only do in suspicious patients	12	75
c. Rarely do	2	12.5
d. Never (only using ultrasound to evaluate prostate)	0	0
6.In your practice, how much prostate cancer are found using		
a. Histopathological results that acquired through operation (open prostatectomy (OP) or transurethral resection of the prostate (TURP)	12	75
b. Detected using PSA then OP or TURP	0	0
c. Detected using PSA then prostate biopsy	1	6.25
d. Detected through digital rectal examination and OP or TURP	3	18.75
e. Detected using digital rectal examination and prostate biopsy	0	0
7.In your practice how much prostate cancer are found in Stage		
a. Stage I	1	6.25
b. Stage II	1	6.25
c. Stage III	2	12.5
d. Stage IV	5	31.25
e. Not known	7	43.75
8.How much patients in prostate cancer treatment pay with		
a. BPJS PBI	7	43.75
b. BPJS non PBI	9	56.25
c. Self-paid	0	0
d. Private insurance	0	0

non-cancer conditions may also increase PSA, including benign prostatic hyperplasia (BPH), acute bacterial prostatitis, chronic inflammatory states, recent ejaculation, and prostate manipulation (such as catheterization or digital rectal examination) [6-7]. Therefore, the interpretation of PSA must consider clinical context and adjunct assessments such as DRE and imaging. The limited availability and coverage of PSA testing under JKN pose a significant barrier to early detection of prostate cancer. Early detection is critical for improving patient outcomes, as localized prostate cancer is more amenable to curative treatment.

Study by Merriel S, highlighted the significance of PSA testing in detecting prostate cancer by analyzing 9,837 prostate cancer cases from 33,359 male 2018 NCDA patient dataset [8]. With 74% (7,258/9,837) symptomatic

prostate cancer patient and 19% asymptomatic prostate cancer patient were found, this study underscored the important of PSA testing in detecting prostate cancer. According to this study, prostate cancer patients are most aged 60-69 years old, which is in accordance with our findings. Furthermore, the study demonstrated that PSA testing and prostate cancer detection were subject to disparities based on practice variation. From our study's urology practice survey, we found that PSA testing varied in post-JKN periods and that prostate cancer stages were more advanced in this period.

The 16-year follow-up of the European Randomized study of Screening for Prostate Cancer (ERSPC) conclusively demonstrated that regular screening using prostate-specific antigen (PSA) significantly reduces prostate cancer (PCa) mortality. The study revealed a 20% decrease in prostate cancer deaths among men who underwent PSA screening compared to those who did not. This significant finding, represented by a rate ratio of 0.80 (95% confidence interval [CI] 0.72–0.89, $p < 0.001$), highlights the crucial role of repeated screenings [9]. Moreover, the Prostate Testing for Cancer and Treatment (ProtecT) trial showed a significant reduction in prostate cancer metastases after comparing monitoring, surgery, and radiotherapy [10]. In our study, we found that prostate cancer metastasis was lower during pre-JKN periods than during post-JKN periods (Figure 3).

In countries where prostate cancer screening programs are well established, such as the United States and several European countries, decentralization of PSA testing to the primary care level enables early detection and reduces metastatic presentation rates. For example, the U.S. National Cancer Institute reported a decline in metastatic prostate cancer after PSA introduction, followed by a rebound after PSA screening recommendations were reduced, suggesting direct dependence on access to PSA testing [5, 11]. Similarly, South Korea, an Asian country with a national insurance system reports much earlier-stage detection because PSA testing is reimbursed at the primary care level [12].

In contrast, LMICs (India, Malaysia, sub-Saharan Africa) report high rates of metastatic prostate cancer at presentation, attributed to limited PSA access, lack of screening policy, and delayed referral [13-15]. Our findings mirror these patterns: PSA in Indonesia is not covered in primary care under JKN, requiring referral to secondary or tertiary hospitals. This structural barrier likely contributes to delayed presentation and higher PSA levels at diagnosis. These comparisons suggest that beyond clinical factors, policy and reimbursement decisions directly influence disease stage at diagnosis. In health systems where PSA is accessible early (primary care), patients are diagnosed earlier. Where PSA access is restricted or financially burdensome as seen in many LMICs and under JKN patients are diagnosed later and present with advanced disease.

The study is limited by the use of data from a single tertiary referral hospital (Hasan Sadikin). While this hospital served as the primary uro-oncology facility in West Java during the study period, its data may not be representative of the broader population.

Despite limitations, this study offers valuable real-world data on JKN's impact on prostate cancer care in Indonesia, particularly highlighting disparities in PSA testing. By focusing on the main referral hospital and surveying urologists, it reveals shifts in staging and treatment, identifying key areas for improvement in a low-to-middle-income setting.

In primary care settings under JKN, PSA testing is not reimbursed and thus not routinely available. However, physicians still may utilize alternative methods such as digital rectal examination (DRE), urinalysis to rule out infection or hematuria, and simple symptom-based questionnaires, such as the International Prostate Symptom Score (IPSS), to identify patients who may require referral. While these methods cannot replace PSA for early cancer detection, they provide a pragmatic approach to risk stratification and referral prioritization when PSA testing is inaccessible.

This study provides critical insights for strengthening future prostate cancer care in Indonesia. By clearly demonstrating the impact of JKN implementation on PSA testing, it highlights opportunities for targeted policy adjustments to improve early detection. The findings offer a valuable foundation for developing proactive interventions and fostering a more effective and equitable prostate cancer care system across Indonesia.

The results of this study indicate that limited PSA testing post-JKN led to an increase in median PSA and a shift towards more advanced disease, suggesting that early detection is reduced. While the study is limited by its single-center design, it provides valuable real-world data highlighting disparities in PSA testing and revealing shifts in treatment patterns. These findings underscore the urgent need for targeted policy adjustments to improve early detection, particularly within primary care settings.

Future studies should include prospective, multicenter designs to evaluate whether enabling PSA testing in primary care results in earlier cancer detection and improved treatment eligibility (e.g., radical prostatectomy). Economic evaluation comparing cost-benefit of decentralizing PSA testing versus treating advanced metastatic disease would also be valuable. Incorporating patient-level variables, physician decision-making factors, and qualitative barriers to care would strengthen the evidence needed to support policy change at the national level.

Author Contribution Statement

Aaron Tigor Sihombing: Conceptualization, Methodology, Data Collection, Formal Analysis, Writing – Original Draft, Supervision. Antonia Kartika: Data Validation, Survey Design, Visualization, Writing – Review & Editing. Antoninus Hengky: Literature Review, Statistical Analysis, Interpretation of Results, Writing – Review & Editing.

Acknowledgements

None.

Ethical Statement

This study was conducted in accordance with the Declaration of Helsinki and approved by the Health Research Ethics Committee of Hasan Sadikin General Hospital, Bandung, Indonesia (Approval Number: DP.04.03/D.XXIV.16/18124/2024). Informed consent was waived due to the retrospective nature of the study using anonymized patient data. All survey respondents provided informed consent prior to participation.

Availability of Data

All data generated or analyzed during this study are included in this published article. No additional datasets were generated or analyzed.

Conflict of Interest

The authors declare no conflict of interest.

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