

Public perception towards centralised volume-based procurement in China: a social intelligence analysis

Introduction

Trust is the cornerstone of healthcare, playing a vital role in navigating the complex principal-agent problem among healthcare providers, patients, and medical insurers.[1–3] In a fast-evolving society, trust is built not only on reciprocity between stakeholders but also on meeting public expectations, which requires communication of accurate and sufficient information to everyone to ensure transparency and equity in healthcare.[2,4] Empirical evidence has shown that unfair resource allocation, lack of transparency and misinformation can undermine trust at both individual and societal levels,[5–9] while few studies have examined how changes in individual trust constitute or undermine institutional trust in healthcare.[10,11] Understanding the process of trust building is critical to the development of resilient health systems, especially in low- and middle-income countries (LMICs).[12–14]

Due to information asymmetry, patient benefits are not always perceivable, rendering healthcare a reputation good increasingly shaped by social media portrayals.[15–18] An example is the recent public debate over volume-based procurement (VBP) of medicines in China. Introduced in 2018, VBP effectively reduced drug prices and promoted the use of domestically produced generic medications.[19–21] Despite censorship, a rare public outcry regarding the quality of domestically manufactured drugs and the VBP policy emerged in January 2025, raising questions about the reliability of the health reimbursement and procurement system.[22] Although the National Healthcare Security Administration (NHSA) vowed to undertake thorough investigations and responded with over 100 peer-reviewed journal articles on the effectiveness of VBP-acquired drugs, public scepticism endures.[23–25]

To elucidate the factors underlying this debate, we retrospectively gathered data throughout January 2025 from Weibo—the largest microblogging platform and a pivotal arena for policy debates over the past decade.[26–28] Leveraging this data alongside the latest natural language processing (NLP) tools, we conducted a social intelligence analysis, to reveal the topics and sentiments underpinning the public discourse, thereby providing insights into how the debate was formulated and propagated. These findings can inform policymakers by clarifying the divergent expectations of the public and service providers, ultimately fostering improved policy design and implementation.[29–31]

Methods

Data collection

Web scraping of Weibo data was conducted using the GooSeeker platform,[32] which is a selenium-based tool that has been extensively used for data collection on Weibo in previous literature.[33–35] Due to Weibo’s restriction of capping search results at 50 pages per timeframe, it was not technically possible to capture all available results. In addition to these technical constraints, the search outcomes are subject to censorship and privacy settings.

To mitigate these issues, we established sampling intervals of 6 and 24 hours to collect as much data as possible throughout January 2025, employing eight Chinese keywords related to volume-based procurement (VBP). The searches were conducted between 27 February and 1 March 2025, a period sufficiently recent to avoid posts being obscured by privacy settings.

The collected data then underwent standard preprocessing procedures to ensure consistency and quality, with duplicate entries removed and irrelevant content filtered out based on the specified keywords. The keywords used for data collection are provided in the Supplementary Materials.

Topic modelling

To extract the underlying themes within the dataset, we conducted topic modelling using BERTopic—a state-of-the-art algorithm that leverages transformer-based text embeddings in tandem with clustering techniques.[36] The model was meticulously calibrated to identify coherent topics that capture the key themes emerging from public discourse on volume-based procurement (VBP).

In contrast to the more traditional latent Dirichlet allocation (LDA), a probabilistic model that assumes each document is a mixture of topics, with each topic represented as a distribution over words,[37] BERTopic employs a pre-trained text embeddings model to map each post into a high-dimensional semantic space, where semantically similar texts are more likely to cluster together.

UMAP and HDBSCAN algorithms are used for dimension reduction and clustering the high-dimensional embeddings of texts.[38,39] The density-based method of text embedding clustering, compared with LDA, more effectively removes outliers and small, noisy clusters of text embeddings. This approach thus sharpens the focus on the main themes emerging from the data.

As the clustering is not based on any word frequency, we deployed ChatGPT 3.5, along with the KeyBERT algorithm,[40,41] to summarise the representative text with sentences and keywords.

Sentiment analysis

Sentiment analysis was carried out using Baidu NLP API,[42] which are specifically designed for processing Chinese-language content. This analysis assessed the polarity of each post, categorising sentiments into positive, negative, or neutral. The sentiment results provided

quantitative insights into public attitudes towards the VBP policy, facilitating a deeper understanding of the emotional tone underpinning the public debate.

Qualitative analysis

Complementing the quantitative methods, a qualitative analysis was undertaken to capture the subtleties and contextual nuances of the public discourse. A subset of posts representing key themes was manually coded and analysed to elucidate underlying narratives and contextual factors. This mixed-methods approach allowed for the exploration of how individual expressions of trust—and scepticism—contributed to broader perceptions of institutional trust in the healthcare system.

Results

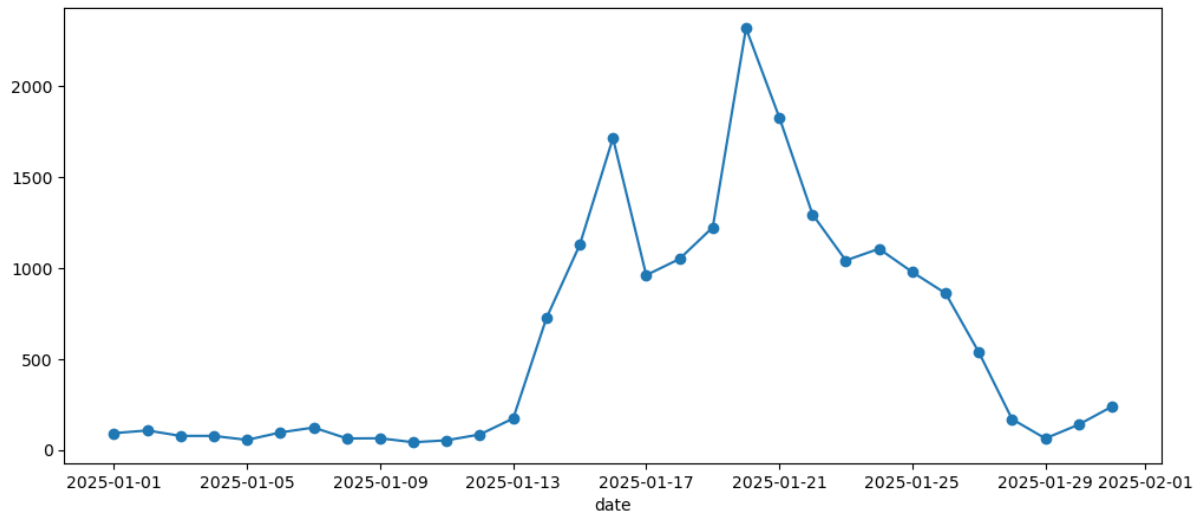
General description

Web scraping yielded 73,078 data records. The records were deduplicated to 23,738 and 19,555 posts were identified as relevant. Full-text data for 60,228 comments in 18,485 threads were successfully retrieved. Based on the trend of Weibo posts associated with VBP, the timeline can be divided into three phases:

- 1–12 January: Baseline period preceding major discussions.
- 13–17 January: Initial surge in discourse following *Sanlian Lifeweek* coverage.
- 18–31 January: Further debate, particularly driven by Caixin coverage.

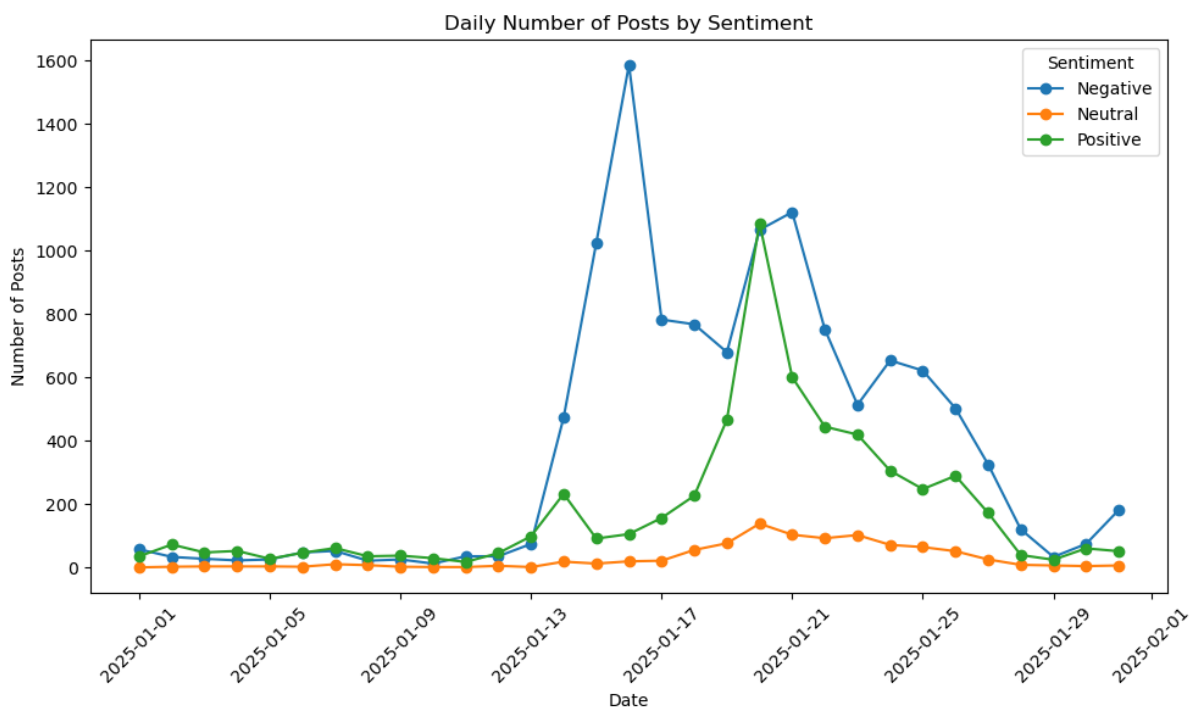
The most reposted Weibo post was published by Sanlian Lifeweek on 13 January 2025, marking the initial stage of the discussion, which peaked on 16 January. The article, reposted over 220,000 times, focused on the withdrawal of foreign medicines from the Chinese market due to their exclusion from the VBP selection process. Sanlian further examined the responses of private hospitals, e-commerce platforms, and insurance companies.

The second most reposted post featured Caixin coverage of a joint proposal by 20 Shanghai CPPCC members, titled "Proposal on Ensuring Access to Effective Medications under the Centralised Volume-Based Procurement Policy." This post ignited further debate, peaking in late January, as it raised rare but critical concerns about the quality of domestically produced drugs. The coverage explicitly questioned the effectiveness of Chinese-made medicines.



Emotional responses

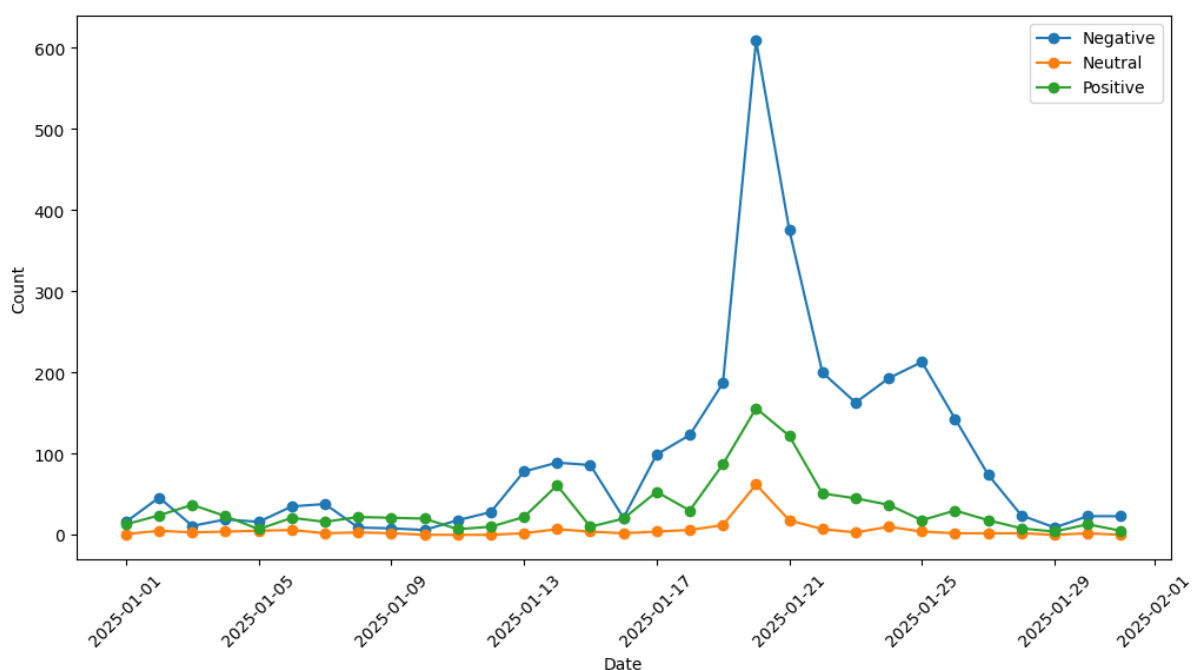
Using Baidu NLP API, we estimated the sentiment of each original VBP-related post throughout January 2025. From the beginning of January until 13 January, sentiment levels remained relatively stable, with low counts across all three categories. There were small fluctuations, but no significant spikes, indicating that discussions related to VBP were minimal or not highly polarising during this period.



A major shift occurred on 15 January, when negative sentiment spiked dramatically following the publication of a Sanlian Lifeweek report. Interestingly, our model identified Sanlian Lifeweek's tone as mostly positive, yet public reaction was overwhelmingly negative. This suggests that even positively framed media coverage can be perceived differently by audiences, triggering widespread criticism and concern. Negative sentiment surged to its highest point by

17 January, dominating online discourse. Positive sentiment also began to rise but at a much lower rate. Neutral sentiment showed only a minor increase, remaining the least significant category in terms of volume. This period marks the peak of public backlash and controversy surrounding VBP.

Notably, verified accounts played a significantly larger role in the second wave of discussion than in the first. During the initial wave, around a hundred verified accounts, including celebrities, participated in the discussion. However, by the second wave, this number had increased sixfold, highlighting a surge in engagement from influential figures. This shift suggests that the VBP debate gained significant traction over time, drawing greater attention from public figures and amplifying the conversation, especially the negative perception of VBP, on social media.

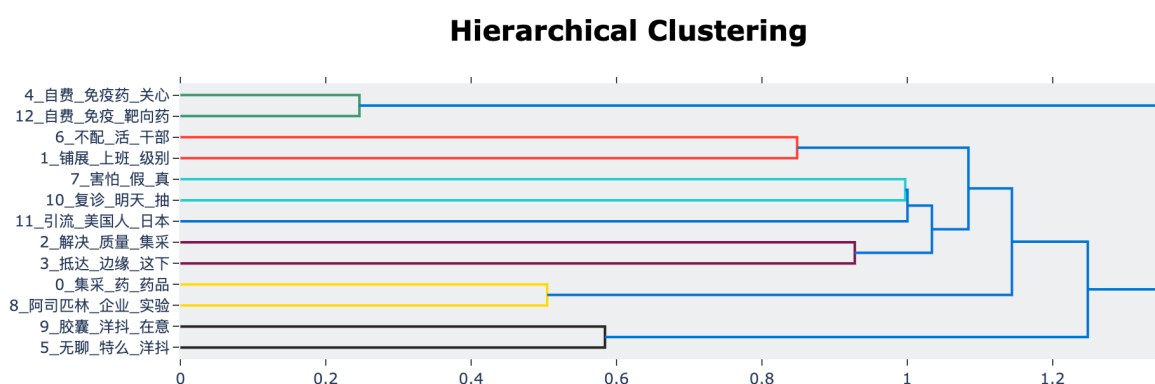
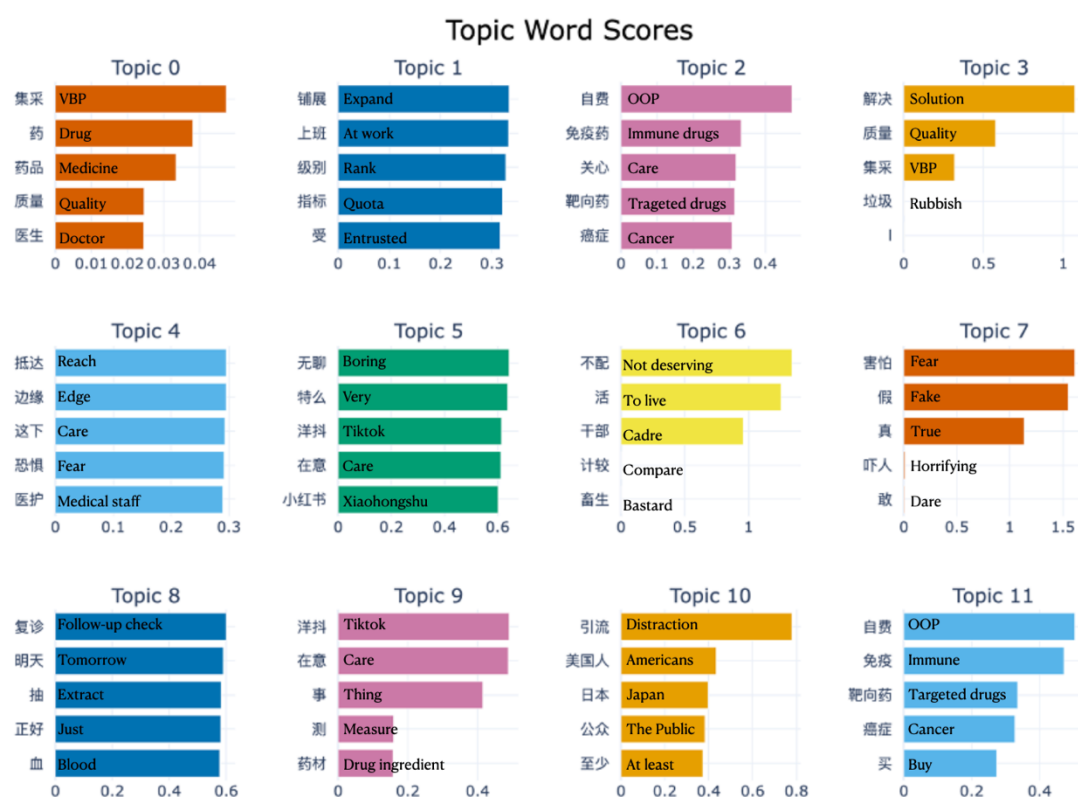


Following the peak in negative sentiment, there was a slight decline, but it remained consistently high, with another notable surge around 20 January. In contrast, positive sentiment continued to grow, reaching its highest point around 21 January, but it never came close to surpassing negative sentiment. The figure does not indicate a temporary balance between positive and negative views; rather, negative sentiment remained dominant throughout, despite increasing support.

In the final weeks of January, both neutral and positive sentiments gained some ground, reflecting a gradual increase in acceptance of VBP. However, negative sentiment remained the primary driver of public discourse, suggesting that scepticism and criticism persisted within the community. While support for VBP grew, the controversy was far from resolved, and negative perceptions continued.

Topic dynamics

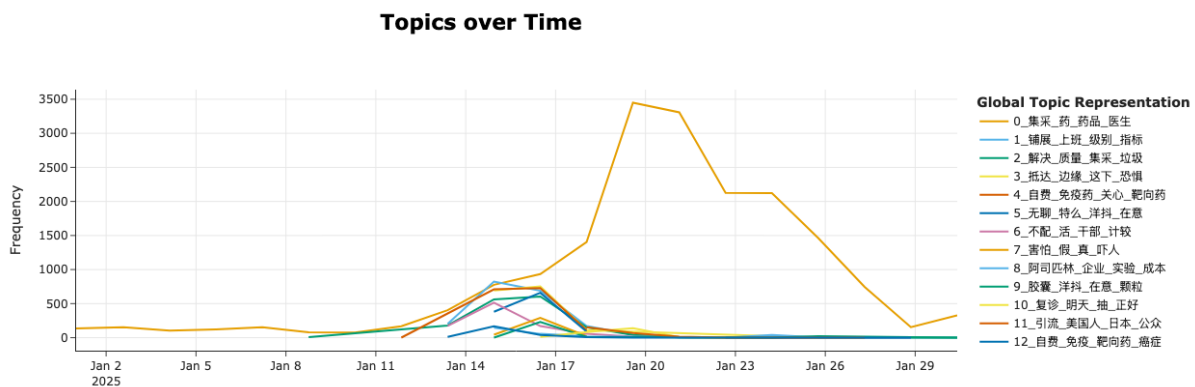
Twelve topics were identified using BERTopic and subsequently grouped into seven overarching themes. Topics 0 and 8 formed the most frequently discussed theme, focusing on the clinical efficacy of VBP-acquired drugs. Topics 1 and 6 addressed concerns about cadre privilege, making it the second most discussed theme. Topics 7 and 10 captured personal emotions related to visiting a doctor, particularly fear. Lastly, Topics 5, 9, and 11 reflected concerns about discussions being sidetracked by unrelated issues, such as TikTok refugees and international news.



Analysing the timeline of these discussions, we found that the debate predominantly centred on the clinical efficacy of VBP-acquired drugs. The conversation around potential solutions to improve efficacy (Topic 2) began slightly before the Sanlian report was published on 13 January. In contrast, concerns regarding cadre privilege (Topics 1 and 6) and the affordability

of purchasing cancer drugs out of pocket (Topic 12) emerged immediately after the Sanlian report.

Following the Caixin report on 18 January, five new topics surfaced. Topics 5, 9, and 11 reflected concerns about the discussion being overshadowed by other news events, such as the TikTok refugee issue. Topic 7 highlighted patients' fears regarding low-quality drugs and their potential health risks. Meanwhile, Topic 8 focused on the calculation and estimation of costs, as well as the experimental efficacy of aspirin.



Discussion

Our research is one of the first academic studies to describe and analyse the public debate on VBP in China, providing insights into how the discourse has been shaped and propagated. While we do not intend to comment on the actual quality of domestically produced drugs, we provide evidence of a framing shift that has significantly altered the debate from its original form as a technical debate.

Popular media triggered the debate

The first question we aimed to answer was whether this debate was spontaneous or triggered by certain events. Agenda-setting is one of the most significant frameworks for understanding power, with popular media playing a central yet complex role in communicating policy needs and benefits.[43–45] Although an increasing number of citizens have turned to social media to acquire news, the extent to which traditional media continue to influence agenda-setting remains widely debated.[46,47] Our analysis demonstrates that reports from professional media retain a robust capacity to set the agenda, even within a predominantly social media landscape, where initial reporting serves as a catalyst for broader debates.

The reports coincided with local parliamentary sessions, key events that influence healthcare funding decisions. The political context not only legitimised the debate but also mobilised a broader cross-section of citizens to question the transparency and fairness of the procurement process. Although negative sentiments were already circulating online, it was the strategic timing and framing of traditional media reports that amplified these concerns. Political cycles

also play a vital role; previous literature indicates that government responsiveness to civil society—on issues such as air pollution—increases during the parliamentary meetings. [48–51]

Inequality drove distrust and mistrust

Secondly, the underlying agenda driving the debate proved particularly intriguing. Our topic model indicates at least 12 topics. Based on the timeline of the topics, it was interesting to find that although the Sanlian report that initially sparked discussions was met with predominantly positive sentiment in analysis, it soon became intertwined with themes of inequality on social media. This evolution underscores the significant role these platforms play in shaping and directing public discourse.

This shift is critical as it illustrates how perceived disparities can undermine public trust and challenge the legitimacy of government practices. Between 13 and 17 January 2025, social media users abruptly redirected their focus to perceived inequities in healthcare. Allegations that medicines were being preferentially allocated to Communist cadres sparked widespread public outrage, transforming VBP from a technical policy matter into a potent symbol of systemic inequality.

After 18 January, the conversation broadened to include discussions on patient autonomy and the right to choose between originator and generic medicines, as a way to withdraw from the health insurance system. Such developments highlight that when citizens perceive the system as rigged in favour of a privileged few, their confidence in the institution diminishes, fuelling scepticism regarding policy intentions and regulatory practices.

Scepticism fuelled further discussion

Ultimately, the key issue is whether—and how—the debate will conclude. Although initial discussions had largely subsided by 16 January, public interest was revived, sustaining the debate until 29 January. Two pivotal events contributed to this extended discourse. The first was the Caixin report, which reignited concerns, and the second—more consequential—was the controversy that erupted on 24 January 2025, when an article exposing widespread data duplication in consistency assessment reports gained traction on social media.

This revelation cast doubt on the integrity of the data used to evaluate multiple generic drugs—data that is fundamental to ensuring their safety and efficacy. In response, the National Medical Products Administration acknowledged that some data on its website had indeed been duplicated. Rather than resolving the issue, this admission only intensified public scrutiny. However, an analysis of related social media posts indicated that interest in these technical matters was considerably lower than the previous focus on societal disparities.

Although the controversy fuelled further discussion, it did not lead to any definitive measures, leaving behind predominantly negative sentiments. In the responses from the NHSA, it is noted that the drugs have been tested in clinical trials.[52–55] Also, previous literature indicated that the policy has had a considerable negative impact on listed companies in China, spurring

pharmaceutical companies to innovate.[56–58] However, its long-term effects on health outcomes remain to be seen.

Implications for policy and future research

The interplay between traditional media coverage, political timing, and regulatory oversight has transformed what was once a technical industry issue into a multifaceted public controversy, underscored by deep-seated concerns about inequality.

The framing of the debate as a struggle for social justice has not only broadened the scope of public concern but also significantly eroded trust in government institutions. This dynamic underscores the urgent need for a comprehensive government response that addresses both the immediate regulatory shortcomings and the broader societal inequities that fuel public discontent.

To restore public trust, it is imperative that policymakers implement transparent procurement practices and robust regulatory mechanisms that ensure fairness and accountability. Specifically, the government should:

- **Enhance Transparency and Accountability:** Reforms must focus on opening up the procurement process and strengthening oversight mechanisms to ensure that all decisions are made impartially and based on robust, verifiable data. This would help counter the narrative of inequality that currently undermines public confidence.
- **Address Systemic Inequalities:** Beyond technical adjustments, there is a pressing need to tackle the underlying social and economic disparities that contribute to perceptions of bias. Policymakers should consider initiatives that promote equitable access to healthcare and safeguard the rights of all citizens, thereby reinforcing the legitimacy of government actions.
- **Engage in Proactive Communication:** In an era characterised by rapid information dissemination, the government must engage proactively with the public. By clearly communicating the rationale behind procurement decisions and the steps being taken to rectify regulatory weaknesses, policymakers can work to rebuild trust and demonstrate a commitment to fairness.
- **Foster Inclusive Policy-Making:** It is crucial that policy decisions are informed by a diverse range of perspectives. Incorporating input from healthcare professionals, independent experts, and the public can help ensure that reforms address not only technical issues but also the ethical and social dimensions of healthcare delivery.

Limitations

Recognising that our findings are deeply influenced by China's stringent censorship regime—where both traditional and social media are subject to selective reporting—it is essential for future research to adopt a multi-method approach. Triangulating media analysis with independent interviews, academic studies, and international reports will provide a more comprehensive understanding of the issues at hand. In turn, this broader evidence base can

better inform government reforms aimed at fostering a more resilient and transparent healthcare system.

Conclusions

Our study has demonstrated that what began as a technical debate on VBP in China evolved into a broader discourse encapsulating critical concerns over inequality and governance. The transformation of the debate—from a narrowly defined pharmaceutical policy issue into a symbol of systemic injustice—highlights how perceptions of unequal treatment can significantly erode public trust. Traditional media, with its powerful agenda-setting role, coupled with strategic political timing, not only amplified these concerns but also revealed the fragile interplay between policy processes and public sentiment.

The evidence suggests that when citizens perceive inequities in healthcare procurement, it can catalyse widespread scepticism about the integrity of both regulatory frameworks and government decision-making. Such erosion of trust underscores the necessity for comprehensive reforms. Policymakers must address both procedural shortcomings and the broader socio-economic disparities that underpin public discontent. This involves enhancing transparency and accountability in the procurement process, engaging in proactive and inclusive communication, and ensuring that policy-making is informed by a diverse range of stakeholder perspectives.

Ultimately, restoring public confidence in healthcare systems requires more than technical adjustments; it demands a concerted effort to rectify deep-seated inequalities. Future reforms should focus on creating an equitable framework that not only meets regulatory standards but also fosters a resilient, transparent, and fair governance structure—one that can sustain the trust of all citizens in the face of ongoing challenges.

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