

Identifying Adaptive Challenges In Food Security Management: An Analysis Of North Kalimantan Governor's Leadership In Addressing Staple Food Price Fluctuations

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Abstract: Food security represents a complex challenge requiring adaptive leadership, particularly in border regions with challenging geographical characteristics such as North Kalimantan. This study aims to analyze the capability of identifying adaptive challenges in the leadership of the North Kalimantan Governor regarding the management of supply and price stability of staple goods in Nunukan and Bulungan Districts. The ability to identify adaptive challenges encompasses four main indicators: distinguishing between technical and adaptive challenges, differentiating adaptive leadership from formal authority, maintaining disequilibrium and mobilizing adaptation, and observing-interpreting-intervening. The study employs a qualitative approach with case study methodology through in-depth interviews with 9 informants and thematic analysis based on four adaptive capability indicators. The findings reveal that the Governor has demonstrated good capability in identifying the adaptive nature of food security challenges, particularly through recognition that 80% dependence on external supply and Malaysia's economic dominance constitute adaptive challenges requiring structural transformation. The implementation of the SIAP SIGAPKU application as a real-time monitoring system and cross-sectoral joint team coordination reflects adaptive leadership practices that transcend formal authority. Managing disequilibrium through tiered monitoring and gradual coaching systems has proven effective in mobilizing stakeholder adaptation. However, strengthening is still needed in terms of mobilizing substantial resources and providing concrete support for business actors to achieve sustainable food security independence.

Keywords: Adaptive Leadership, Food Security, Border Regions, Price Stability, Adaptive Challenges.

INTRODUCTION

Food security constitutes one of the fundamental pillars in national development requiring serious attention from every level of government [1][2]. In the global context, food price fluctuations have become a complex issue influenced by various factors ranging from climate change, geopolitical instability, to international trade dynamics [3][4]. The Food and Agriculture Organization (FAO) notes that global food price volatility has increased significantly in the last decade, with impacts particularly felt by developing countries [5][6][7]. This condition demands leadership that is not only capable of responding to changes reactively but also proactively in anticipating and managing adaptive challenges. Indonesia, as an archipelagic country with high geographical and demographic diversity, faces specific challenges in maintaining staple food price stability [8][9]. The complexity of supply chains involving thousands of islands, differences in planting seasons, and dependence on imports for several strategic commodities creates highly fluctuating price dynamics [10][11]. Data from the Central Statistics Agency shows that food inflation in Indonesia often becomes a major contributor to national inflation, with very high variations between regions [12]. This condition requires a leadership approach capable of distinguishing between technical problems that can be solved with standard procedures and adaptive challenges that require paradigm changes and innovation in policy management. Adaptive leadership in the context of food security management becomes increasingly relevant when faced with challenges that cannot be predicted and require solutions that have never been implemented before [13][14]. Adaptive challenges differ fundamentally from technical problems, where adaptive challenges require changes in priorities, beliefs, habits, and loyalties of various stakeholders [15]. In the context of food price management, this includes the ability to identify whether price increases are caused by technical factors such as distribution disruptions that can be overcome with market operations, or adaptive

challenges that require restructuring of distribution systems or changes in community consumption patterns.

North Kalimantan Province, as Indonesia's youngest province, faces unique complexities in food security management. Its geographical position directly bordering Malaysia creates cross-border trade dynamics that affect domestic price stability [16]. Moreover, its status as a new province with infrastructure still under development adds complexity to the management of staple goods distribution. Data from the North Kalimantan Integrated Price and Inflation Control Information System shows that monthly inflation rates are highly fluctuating, with the highest peak in December 2024 reaching 0.44% and the lowest in July at 0.01% [17]. Staple food price fluctuations in North Kalimantan show patterns that require proper identification of adaptive challenges. Based on monitoring data from the Department of Industry, Trade, and Cooperatives of North Kalimantan Province, significant price volatility is evident in various strategic commodities. Rice prices increased from IDR 14,066 per kg in 2022 to IDR 17,500 per kg in 2024, while other commodities such as chili showed more extreme fluctuations from IDR 70,682 per kg in 2022 to IDR 88,333 per kg in 2024 after reaching a peak of IDR 110,000 per kg in 2023 [18]. The ability to identify adaptive challenges becomes important in the context of Nunukan and Bulungan Districts, which have special characteristics as border regions [19]. Both districts face dual challenges of dependence on distribution from distant economic centers and the influence of the Malaysian market, which often offers more competitive prices for several commodities. Market infrastructure data shows that Nunukan District has 37 active markets and 11 inactive markets, while Bulungan District has 15 active markets and 4 inactive markets. This condition creates distribution challenges that require proper identification of whether these problems are technical or adaptive in nature.

Table 1. Strategic Commodity Price Fluctuations in North Kalimantan (2022-2024)

Commodity	Unit	2022 (IDR)	2023 (IDR)	2024 (IDR)	Change (%)
Rice	Kg	14,066	16,750	17,500	+24.4
Cooking Oil	Liter	15,409	15,000	17,000	+10.3
Eggs	Kg	39,966	40,000	32,710	-18.2
Sugar	Kg	15,000	18,750	20,000	+33.3
Beef	Kg	167,121	160,000	150,000	-10.3
Chili	Kg	70,682	110,000	88,333	+25.0

Source: Department of Industry, Trade and Cooperatives, North Kalimantan Province, 2024

Identifying adaptive challenges in food security management in North Kalimantan requires a comprehensive approach in distinguishing between technical problems and adaptive challenges [20][21]. Technical problems such as transportation disruptions or temporary stock shortages can be addressed with market operation mechanisms or logistical adjustments. However, adaptive challenges such as changes in community consumption patterns, dependence on cross-border imports, or restructuring of distribution systems require fundamental changes in policy approaches. The North Kalimantan Governor's ability to identify the nature of challenges faced will determine the effectiveness of interventions implemented, making it a determining factor in maintaining price stability and availability of staple goods in this strategic border region.

METHOD

This study employs a qualitative approach with case study research design aimed at analyzing the capability of identifying adaptive challenges in the leadership of the North Kalimantan Governor regarding the management of supply and price stability of staple goods. Case study methodology was chosen because it allows for in-depth analysis of contemporary phenomena in real-life contexts, particularly in understanding the complexity of adaptive leadership in border regions with unique geographical characteristics. The research locus focuses on Nunukan and Bulungan Districts as representatives of border regions facing specific challenges in food security management.

The research design was developed to explore four main indicators of adaptive challenge identification capability based on the theory of [15]: (1) the ability to distinguish between technical and adaptive challenges, (2) the ability to differentiate adaptive leadership from formal authority, (3) the ability to maintain disequilibrium and mobilize people to adapt, and (4) the ability to observe, interpret, and intervene. The study uses data source triangulation through in-depth interviews, field observations, and document analysis to ensure validity and reliability of findings. Data collection was conducted in stages following strict research ethics protocols, including informed consent from all informants and maintaining confidentiality of sensitive information related to regional strategic policies. Primary data sources were obtained through in-depth interviews with 9 key informants selected through purposive sampling based on direct involvement in the food security management process in North Kalimantan. Informants consisted of: (1) Governor of North Kalimantan as the highest policy maker at the provincial level, (2) Chairman of Commission II of the North Kalimantan Provincial Parliament overseeing economic and development policies, (3) Civil Servant Investigator of the Department of Industry, Trade, Cooperatives and SMEs of North Kalimantan Province responsible for trade supervision, (4) Head of Bulog Regional Office Bulungan managing rice distribution and price stabilization, (5) Head of Trade Division of DKUKMPP Nunukan District, (6) Head of Yamaker Market Nunukan overseeing local trade activities, (7) Junior Expert Trade Supervisor of the Department of Industry, Trade, Cooperatives and SMEs Bulungan District, (8) Head of UPT Bulungan Market, and (9) Logistics/Distributor Entrepreneur UD Salsabila representing private sector perspectives. Informant selection was based on criteria of direct involvement in the food security policy chain, multi-level government representation (provincial-district), and public-private sector representation to obtain comprehensive perspectives.

Secondary data sources were obtained from official government documents including monthly inflation data from the North Kalimantan Integrated Price and Inflation Control Information System (SIAP SIGAPKU), staple goods price monitoring reports from the Department of Industry, Trade, Cooperatives and SMEs of North Kalimantan Province for the period 2022-2024, market activity data across all districts/cities, and reports on inspection activities and market operations. Additional data were also obtained from the SIAP SIGAPKU application providing real-time information on prices and stock availability in various traditional markets. Data analysis was conducted using thematic analysis techniques with stages: (1) transcription and coding of interview data, (2) categorization of findings based on four indicators of adaptive challenge identification capability, (3) triangulation with secondary data for finding validation, (4) interpretation of results with the theoretical framework of [15], and (5) drawing conclusions and formulating policy recommendations. Data validity was ensured through member checking with key informants and peer debriefing with public policy experts to ensure interpretation accuracy and research finding relevance.

FINDINGS AND DISCUSSIONS

Distinguishing Between Technical and Adaptive Challenges

The identification of adaptive challenges in food security management in North Kalimantan reveals significant complexity, where the Governor is faced with the need to distinguish between technical problems that can be solved with standard procedures and adaptive challenges that require fundamental paradigm changes. Field data analysis reveals that most problems in the supply and price stability of staple goods in this region are adaptive in nature, not merely technical problems that can be overcome with conventional market operations.

North Kalimantan's dependence on staple goods supply from outside the region reaches 80%, with geographical characteristics as a border region having easier access to Malaysia compared to other Indonesian regions. This condition creates a fundamental dilemma where border communities are more dependent on Malaysia's economy to meet their basic needs. This problem cannot be solved solely through market operations or price adjustments, but requires structural transformation in local distribution and production systems.

Poor transportation infrastructure becomes a key indicator showing the adaptive nature of the challenges faced. Road conditions requiring six hours to travel 60 kilometers reflect systemic limitations that cannot be overcome through short-term technical solutions. This problem is closely related to development priorities, budget allocation, and long-term commitments that require changes in infrastructure development policy approaches.

Limited local production capacity and dominance of cross-border trade show complex adaptive challenges in terms of regional economic independence. Although natural resources such as cassava and fish from local communities are available, suboptimal distribution and processing systems cause continued high dependence on imports from Malaysia. This requires fundamental changes in local economic development mindset and community empowerment strategies.

This challenge becomes more complex with limited human resources and capital needed to operate goods distribution in remote areas. The need for large capital, many workers, and high operational costs creates high barriers to entry for business actors, thus requiring structural and long-term policy interventions to create appropriate incentives for sustainable distribution system development.

Table 2. Characteristics of Technical vs Adaptive Challenges in Food Security Management

Aspect	Technical Challenge	Adaptive Challenge	Condition in North Kalimantan
Supply Dependence	Temporary disruption	Structural dependence 80% from outside region	Adaptive
Infrastructure	Road repair	Transportation system restructuring	Adaptive
Distribution Access	Route adjustment	Regional connectivity development	Adaptive
Malaysia Dependence	Trade regulation	Economic orientation change	Adaptive
Local Production Capacity	Volume increase	Production system transformation	Adaptive

Source: Field Data Analysis, 2025

Analysis based on the theoretical framework of [15] shows that the North Kalimantan Governor has demonstrated good understanding in identifying the adaptive nature of challenges faced. Recognition that dependence on Malaysia is a "shameful" problem requiring "hard work" reflects awareness that this problem is not merely a technical issue that can be solved with standard procedures. However, implementing solutions appropriate to the adaptive nature of this challenge still requires further development, especially in terms of resource mobilization and more fundamental system changes. These research findings are consistent with studies conducted by [22], which show that leaders in remote areas often face more complex adaptive challenges compared to urban areas. The ability to distinguish between technical and adaptive problems becomes key to success in food security management in regions with challenging geographical characteristics. Research by [23] also emphasizes that border regions have specific dynamics requiring adaptive approaches in public policy management. To improve the accuracy of adaptive challenge identification, systematic framework development is needed to categorize problems based on their technical or adaptive nature. Research by [24] shows that implementing diagnostic tools can help regional leaders identify challenge characteristics more accurately. Additionally, deeper analytical capacity in leadership teams needs to be developed to ensure that interventions implemented match the characteristics of problems faced

Distinguishing Adaptive Leadership from Formal Authority

The adaptive leadership practices of the North Kalimantan Governor in food security management show significant capability in transcending formal authority limitations. The development of the SIAP SIGAPKU

application as a price and stock availability monitoring system represents a manifestation of adaptive leadership not limited to administrative authority alone. This technological innovation shows the ability to create new solutions that not only depend on formal bureaucratic structures but utilize technology to create more effective and efficient monitoring systems. Cross-sectoral coordination involving various agencies such as Department of Industry, Trade, Cooperatives and SMEs, DPKP, Economic Bureau, and Satpol PP demonstrates adaptive leadership practices that transcend organizational structural boundaries. The formation of joint teams for market operations not only relies on formal hierarchy but creates inter-agency synergy that enables faster and more comprehensive responses to price fluctuations and staple goods availability. This approach shows the ability to mobilize resources outside conventional bureaucratic channels. The implementation of real-time monitoring systems through digital applications reflects the ability to anticipate problems before they occur, not just react after crises happen. Automatic notification features when high prices are detected enable more proactive intervention, which is a key characteristic of adaptive leadership. This system also integrates active participation from district/city governments as admins who update data, creating a collaborative network broader than formal hierarchical structures. The use of technology to reduce official travel costs in price monitoring shows innovation in utilizing limited resources. This approach is not only financially efficient but also enables more continuous and comprehensive monitoring compared to conventional methods. This reflects adaptive leadership capability to find creative solutions in facing resource constraints, which is a common challenge in regions with challenging geographical characteristics like North Kalimantan. Response to cross-border trade dynamics with Malaysia shows the ability to operate outside rigid formal policy frameworks. Recognition of the reality of border community economic dependence on Malaysia while still striving to reduce this dependence shows leadership flexibility not trapped by ideology or formal procedures alone. This approach requires the ability to balance pragmatism in facing field realities with long-term vision for regional economic independence.

Table 3. Comparison of Formal Authority vs Adaptive Leadership Approaches

Dimension	Formal Authority	Adaptive Leadership	Implementation in North Kalimantan
Monitoring System	Manual periodic reports	Real-time digital SIAP SIGAPKU	✓ Adaptive
Agency Coordination	Vertical hierarchy	Horizontal joint teams	✓ Adaptive
Crisis Response	Standard procedures	Proactive intervention	✓ Adaptive
Technology Use	Minimal, traditional	Innovative, efficient	✓ Adaptive
Border Approach	Rigid regulation	Flexible pragmatic	✓ Adaptive
Resource Efficiency	Travel cost waste	Digital optimization	✓ Adaptive

Source: Field Data Analysis, 2025

The theoretical framework of [15] emphasizes that adaptive leadership is a practice, not a position, which is proven in the implementation of North Kalimantan Governor's strategy. The ability to mobilize various stakeholders through technology platforms and cross-sectoral coordination shows deep understanding of the difference between exercising formal authority and practicing adaptive leadership. Innovation in monitoring systems and proactive response to food security problems shows the ability to challenge the status quo and create changes in organizational thinking and acting. These findings align with research by [25], which shows that regional leaders successful in managing food security are those capable of integrating digital technology with cross-sectoral collaborative approaches. Studies by Martinez et al. (2024) also confirm that the use of real-time information systems in commodity price management is a strong indicator of effective adaptive leadership

practices. Research by [26], emphasizes that the ability to operate outside formal bureaucratic frameworks becomes key to successful policy management in regions with complex geographical challenges. To optimize these adaptive leadership practices, further development of digital platforms integrated with national early warning systems becomes an important priority. Research by [27], shows that integration of regional monitoring systems with national databases can significantly improve policy response effectiveness. Additionally, learning mechanisms and replication of these adaptive leadership best practices need to be developed for other regions with similar characteristics, as suggested by [28] in their study on inter-regional policy innovation transfer.

Maintaining Disequilibrium and Mobilizing People to Adapt

Managing disequilibrium in the distribution system and staple food prices in North Kalimantan shows the Governor's capability in maintaining productive adaptive pressure without causing destructive chaos. Significant price fluctuations, such as rice price increases from IDR 14,066 per kg in 2022 to IDR 17,500 per kg in 2024, and chili price volatility reaching IDR 110,000 per kg in 2023 before falling to IDR 88,333 per kg in 2024, create periods of disequilibrium requiring careful management to encourage adaptation without causing social unrest. The intensive monitoring strategy through regular inspections at least once a month and daily monitoring before National Religious Holidays (HBKN) shows efforts to maintain disequilibrium within manageable limits. This approach allows stakeholders to feel the urgency of change without experiencing excessive shocks. Intensifying monitoring to daily before HBKN reflects awareness that certain periods require special attention to prevent excessive disequilibrium. The implementation of tiered coaching systems, from warnings to more firm sanctions, shows the ability to manage resistance to change gradually. This approach allows business actors to adapt to new rules and expectations without experiencing shocks that could disrupt the entire distribution system. Collaboration with Regional Police to handle serious violations while providing coaching for minor violations creates a spectrum of responses appropriate to the level of resistance faced. Stakeholder mobilization through rule socialization and use of social media for policy communication shows systematic efforts to build understanding and acceptance of necessary changes. Involving distributors and traders in the price monitoring system through the SIAP SIGAPKU application creates a sense of ownership in the change process, which is a key element in mobilizing adaptation. However, business actor expectations for more concrete policies show the need for further development in terms of substantial support. Multi-level coordination between central government (Bulog), provinces, and districts/cities in food security management creates a surveillance and balance system that enables gradual adaptation at each government level. Clear role division between Bulog for certain commodity price stabilization, provinces for planning and coordination, and districts/cities for cheap market implementation and price checking creates a structure supporting collective adaptation without neglecting respective level responsibilities.

Table 4. Indicators of Disequilibrium Management and Adaptation Mobilization

Aspect	Indicator	Frequency/Intensity	Effectiveness
Price Monitoring	Regular inspections	Minimum 1x/month	High
HBKN Monitoring	Intensive inspections	Daily (2 weeks before)	Very High
Warning System	SIAP SIGAPKU notifications	Real-time	High
Business Actor Coaching	Warnings and sanctions	According to violations	Medium
Policy Socialization	Social media and direct	Continuous	Medium
Multi-level Coordination	Bulog-Province-District	Regular	High

Source: Field Data Analysis, 2025

Based on the theory of [15], effective disequilibrium management requires the ability to maintain sufficient adaptive pressure to encourage change, but not excessive to cause dysfunction. The North Kalimantan Governor's strategy in managing price fluctuations through real-time monitoring systems and tiered responses shows good understanding of this principle. The ability to identify critical moments such as before HBKN and increase intervention intensity shows sensitivity to productive disequilibrium dynamics. These research findings

are consistent with studies by [29], which show that real-time monitoring systems can improve leaders' ability to manage commodity price volatility. Research by [30] also confirms that tiered coaching approaches are more effective in encouraging business actor adaptation compared to rigid sanction implementation. Studies by [31] emphasize that multi-level coordination in food security management becomes a major factor in maintaining stability while encouraging systemic adaptation. To improve disequilibrium management effectiveness, developing more sophisticated early warning systems becomes an urgent need to predict potential disequilibrium periods. Research by [32] shows that integration of weather, consumption pattern, and economic trend data can improve price volatility prediction accuracy. Additionally, capacity building programs for business actors need to be developed so they can adapt to changing market dynamics, as suggested by [33] in their study on supply chain resilience in remote areas.

Observing, Interpreting, and Intervening

The systematic observation process conducted by the North Kalimantan Governor through the implementation of the SIAP SIGAPKU application reflects the ability to collect data from various sources in real-time and comprehensively. This system enables simultaneous observation of price patterns across all districts/cities, involving admins from each region to ensure data accuracy and timeliness. Observation is not limited to price aspects but also includes stock availability, providing a holistic picture of food security conditions in the region. Interpretation capability is evident from analysis of price fluctuation patterns showing strong correlation between HBKN momentum and price increases. Interpretation that price changes can occur very quickly, even within one day, shows deep understanding of local market dynamics. Recognition that dependence on Malaysia is not only an economic problem but also a matter of national pride shows the ability to interpret issues from broader perspectives, not just economic ones. Intervention design implemented shows experimental and adaptive approaches, starting from digital monitoring system development to joint team formation for field operations. Technology intervention through SIAP SIGAPKU is not only as a monitoring tool but also as a platform for building coordination between government levels. The use of automatic notifications to trigger rapid responses shows proactive rather than reactive intervention design. Flexibility in designing responses based on specific conditions is evident from monitoring intensity variations between regular days and before HBKN. The ability to increase inspection frequency from minimum once a month to daily before critical moments shows adaptability in intervention design. Collaboration with various stakeholders, including Regional Police for law enforcement and Bulog for price stabilization, shows the ability to integrate various policy instruments in one coherent intervention framework. Intervention evaluation and adjustment are evident from system evolution that continues to develop since implementation in 2023, with feature improvements and scope expansion. Feedback from business actors expecting more concrete policies shows that the observation process also includes monitoring the effectiveness of implemented interventions. The ability to recognize gaps between stakeholder expectations and policy implementation shows sophistication in evaluation and adjustment processes.

Table 5. Observation-Interpretation-Intervention Cycle in Food Security Management

Stage	Method/Instrument	Output	Follow-up
Observation	SIAP SIGAPKU	Real-time price data	Trend analysis
	Field inspections	Actual market conditions	Data verification
	Bulog surveys	Stock and distribution	Supply coordination
Interpretation	HBKN correlation analysis	Price spike prediction	Monitoring intensification
	Malaysia dependence mapping	Food independence gaps	Long-term strategy
	Infrastructure assessment	Distribution barriers	Development priorities
Intervention	Joint teams	Integrated market operations	Rule enforcement
	Automatic notifications	Rapid response	Price stabilization
	Business actor coaching	Compliance improvement	Sustainable behavior change

The theoretical framework of [15] emphasizes that the observation-interpretation-intervention cycle is a repetitive process requiring continuous learning. The implementation of SIAP SIGAPKU as the backbone for all three stages shows sophistication in applying adaptive leadership principles. The ability to integrate quantitative data

(prices, stocks) with qualitative insights (business actor feedback, social dynamics) shows a comprehensive approach in understanding food security system complexity. This research supports findings by [34], which show that integrated information systems can improve decision-making quality in public policy management. Studies by [35] also confirm that repetitive approaches in intervention design are more effective in facing market volatility compared to rigid approaches. Research by [36] emphasizes the importance of feedback in the observation-interpretation-intervention process to ensure continuous organizational learning. Regarding optimization of the observation-interpretation-intervention cycle, developing predictive analysis capabilities becomes a priority to improve data interpretation quality. Research by [37] shows that machine learning algorithms can help identify hidden patterns in commodity price data. Additionally, systematic evaluation frameworks need to be developed to measure intervention effectiveness more objectively, as suggested by [38] in their study on evidence-based policymaking in the food security sector.

CONCLUSION

This research reveals that the North Kalimantan Governor has demonstrated good capability in identifying adaptive challenges in managing supply and price stability of staple goods, particularly in distinguishing between technical problems and adaptive challenges requiring structural transformation. This capability is manifested through recognition that 80% dependence on external supply and Malaysia's economic dominance in border regions are not merely technical distribution problems but adaptive challenges requiring fundamental changes in production systems and regional economic orientation. The implementation of the SIAP SIGAPKU application as a real-time monitoring system and formation of cross-sectoral joint teams shows adaptive leadership practices transcending formal authority limitations, creating innovation in coordination and proactive response to price fluctuations. However, gaps still exist in terms of mobilizing more substantial resources and providing concrete support to business actors to reduce structural dependence on Malaysia. Based on these findings, it is recommended to develop systematic diagnostic frameworks for categorizing problems based on their technical or adaptive nature, and enhance integration of regional monitoring systems with national databases to strengthen policy response effectiveness. The Governor's capability in maintaining productive disequilibrium and mobilizing stakeholder adaptation has proven effective through tiered monitoring strategies with intensity adjusted to critical moments such as National Religious Holidays, and implementation of gradual coaching systems from warnings to firm sanctions. The observation-interpretation-intervention process conducted through repetitive cycles utilizing digital technology and multi-level coordination shows sophistication in applying Heifetz et al. (2009) adaptive leadership principles. Nevertheless, the complexity of geographical challenges and infrastructure limitations in border regions still requires more comprehensive approaches in terms of distribution system transformation and strengthening local production capacity. Evaluation of intervention effectiveness also needs strengthening through more systematic feedback mechanisms from business actors and communities. To strengthen this adaptive leadership effectiveness, development of early warning systems integrated with predictive analysis to anticipate price volatility is needed, implementation of comprehensive capacity building programs for local business actors, and establishment of evidence-based evaluation mechanisms to measure long-term impacts of adaptive leadership interventions in achieving regional food security independence.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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