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Network Governance in the HIV/AIDS Response in Batam City: A Social Network Analysis Approach

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Abstract

This study analyzes the governance network involved in the HIV/AIDS response in Batam City using a Network Governance approach. HIV/AIDS remains a critical public health challenge in Indonesia, particularly in Batam, where its spread has shown significant increases. The research employs Social Network Analysis (SNA) to identify key actors, network structures, and the coordination patterns among stakeholders. Data were collected through structured interviews and field observations involving the Health Office, the AIDS Commission, and various non-governmental organizations. The findings indicate that the Health Office and the AIDS Commission function as central actors within the network, exhibiting high levels of centrality. However, collaboration is often hindered by bureaucratic constraints and limited program integration. The study recommends strengthening communication among actors, enhancing community participation, and establishing clear local regulations defining stakeholder roles. With a more inclusive and coordinated approach, the HIV/AIDS response in Batam City is expected to become more integrated and sustainable.

Keywords:
Governance Network; HIV/AIDS Response; Social Network Analysis

Introduction

Indonesian society is currently facing various health challenges that affect national development and social life. One of the most alarming health threats is the spread of HIV/AIDS (Riefkah, 2020). AIDS is caused by the HIV virus, which attacks the immune system and has become one of the deadliest diseases in human history (Insani, Umam, & Miharja, 2022). The first HIV case in Indonesia was identified in 1987 in Bali, and the virus has since spread across the entire country (Purwaningsih & Widayatun, 2008). The Riau Islands Province ranks tenth nationally in cumulative HIV/AIDS cases (Yuniarto, 2023), with Batam City showing particularly high endemicity. The Riau Islands Health Office recorded 700 residents living with HIV/AIDS, 60% of whom are male, with most cases found in Batam City. These conditions demand urgent attention from the government, civil society, and non-governmental organizations.

As a tourism and industrial hub with high population mobility, Batam faces an elevated risk of HIV/AIDS transmission (Harris, 2018). The Batam City Government has made efforts to prevent and manage HIV/AIDS in accordance with Regional Regulation No. 15 of 2007 issued by the Riau Islands Provincial Government. These efforts involve collaboration with multiple stakeholders; however, the implementation often encounters challenges that lead to complex problems.

This study examines the complex issues in managing HIV/AIDS in Batam City, including fragmented and nonsimultaneous interventions, as well as the absence of a city-level regulation specifically governing HIV/AIDS prevention and control. Such a regulation is

essential to prevent conflicts between public health education efforts and prevailing social paradigms. For example, educating the public on the use of protective measures during sexual activity or providing other HIV/AIDS prevention information often clashes with community norms (Margaretha, 2022). These complexities arise partly because collaborative approaches are frequently constrained by bureaucracy and formal procedures. Therefore, a more inclusive and responsive governance model, such as Network Governance, is needed to enhance synergy among various parties, including communities, non-governmental organizations, and local government. This approach employs Social Network Analysis to examine interactions and communication among actors within the governance network.

Research on social networks and governance theory has been conducted by various scholars. An important reference is *Theories of Communication Networks* by Monge and Contractor (2002), which integrates major theories in communication networks. The concept of Governance Networks views conflict as an inherent component of problem-solving and public service delivery, involving competing interests, perceptions, and values among actors seeking to influence public decision-making (Sørensen & Torfing, 2007; Klijn & Koppenjan, 2016). Wasserman and Faust (1994) discuss relationships among actors within networks, while Marin and Wellman (2011) highlight the relevance of network member interactions. However, previous studies have not specifically examined governance network analysis in the context of HIV/AIDS spread. Thus, this research aims to fill this gap by analyzing the actor network involved in HIV/AIDS response efforts in Batam City. This study contributes to the development of governance network analysis by expanding its application in the context of HIV/AIDS prevention and control.

Literature Review

Governance

Governance is defined as a series of socio-political interactions between the government and society in activities related to public interests and governmental interventions in those interests (2012, p. 202). Governance encompasses processes of managing, directing, guiding, organizing, and administering public affairs, and in certain contexts, it can also be interpreted as government.

According to the United Nations Development Programme (UNDP, 1997) in its document *Governance for Sustainable Human Development*, governance refers to the exercise of economic, political, and administrative authority to manage a nation's affairs at all levels. Further, Anggara (2012) explains that governance is a strategic public policy instrument used by the state to promote welfare, integrity, and social cohesion.

Governance involves the participation of non-governmental organizations (NGOs), interest groups, and citizens, alongside governmental institutions, in managing public affairs, particularly in the formulation and implementation of public policies (Angini et al., 2019). It refers to the processes through which a country manages its economic and social resources by regulating interactions between the government and society, resulting in policy formulation and evaluation that ultimately strengthen harmonious relationships among the government, the public, and the private sector.

Collaborative Governance

The focus of collaborative governance lies in public policies and public issues. Public institutions play a crucial role in policymaking, where collaboration aims to reach agreements among stakeholders. Collaborative governance seeks to advance social justice in fulfilling public needs. According to O'Leary and Bingham (as cited in Sudarmo, 2015), collaborative

governance is a set of arrangements in which one or more public institutions directly engage with non-state stakeholders in a formal, consensus-oriented, and deliberative policymaking process. Its purpose is to formulate or implement public policies as well as manage public programs or assets (Ansell & Gash, 2008).

The term *collaborative governance* refers to an approach to public management that involves non-government stakeholders directly, emphasizing consensus and deliberation in collective decision-making aimed at formulating or implementing public policies and programs (Ansell & Gash, 2008). Collaboration is fundamentally linked to the management of social networks, consisting of communication relationships among stakeholders. From this perspective, collaboration theory can be viewed as the analysis of governance processes through the lens of social networks.

The collaborative governance model requires the active involvement of all stakeholders in dialogue, where each represents their respective interests throughout the process (Booher & Innes, 2002).

Network Governance

Network governance refers to a system that integrates the provision of public facilities and services through intensive cooperation and effective coordination among relevant actors (Isett et al., n.d.). It is grounded in several key principles, including trust, reciprocity, negotiation, and mutual dependence among actors. Network governance represents a more inclusive and effective model for addressing the challenges of modern society, which require strong cooperation and enhanced coordination among involved stakeholders.

Research on network governance often focuses on structural and dynamic aspects of networks, including network structure, size, lifespan, relationships, and diversity (Wang & Ran, 2023). The structure of a policy network is not merely an abstract concept, but an essential tool for understanding the dynamics of decision-making and power distribution in policy processes. These patterns reveal how actors interact and collaborate within the network. Structural components include network design, institutionalization, rules of engagement, and power relations, all of which shape patterns of interaction among actors in public policy networks. Relationships within policy networks are not solely about substantive issues but also the relational dynamics among actors (Safitri et al., 2022).

Coordination, extending beyond formal rules, becomes a crucial element through mutual adjustment. Actors adapt their actions and decisions to achieve shared objectives. This approach fosters trust, open communication, and effective collaboration in developing and implementing coherent public policies that provide societal benefits.

As a contemporary paradigm in public administration, network governance offers collaborative solutions to address complex problems and enhance the quality of public service delivery. This approach is driven by multiple factors: problem complexity, limited information and knowledge, uncertainty and lack of consensus, and the diversity of actors with differing perceptions. By encouraging interaction and cooperation among actors, network governance enables the integration of multiple perspectives and resources to produce more comprehensive and effective solutions.

Trust, mutual understanding, open communication, and transparent information exchange serve as the foundational principles for achieving synergy and effective collaboration in resolving complex issues and improving public service quality. Network governance involves interdependent relationships among actors with autonomous authority across the public, private, and social sectors who work together to achieve shared objectives. Networks serve as instruments that bring multiple actors together to interact and work collectively toward

common goals (Kickert, Klijn, & Koppenjan, 1997; Koiman, 1993; Rhodes, 1997, as cited in HN et al., 2023).

The theory of network governance explains how governance is conducted through interactions among interconnected and interdependent actors. These actors—including government agencies, non-governmental organizations, the private sector, and civil society—collaborate to achieve shared goals. Their interdependence forms the foundation of this theory, as they rely on one another's resources, information, and expertise. This perspective provides a contemporary understanding of governance, emphasizing collaboration across diverse actors.

Network governance involves interactions among actors in delivering public services, programs, and policies. These interactions encompass multiple actors with differing interests, knowledge bases, and perceptions of problems. Klijn and Koppenjan (2015) identify three key dimensions of network governance that describe relational patterns within network structures, initiating and facilitating interaction processes that involve enabling actors to engage in shared ideas and activities within the network, designing and coordinating the network, which includes formulating activities and planning processes to strengthen coordination. Such efforts create joint actions across the network and support collaboration in accordance with established regulations, enhancing the quality of information dissemination that focuses on managing network-related materials to broaden information distribution and provide education to the public.

HIV/AIDS

HIV, or *Human Immunodeficiency Virus*, can lead to AIDS, or *Acquired Immunodeficiency Syndrome*, a condition that attacks the human immune system, specifically white blood cells, and ultimately results in severe illness. Even mild infections can become life-threatening because the body is no longer capable of defending itself. HIV invades white blood cells, uses them as hosts to replicate, and eventually destroys them. Since white blood cells are essential for immunity, their destruction leaves the body unable to protect itself from disease (Makarim, 2024). AIDS itself refers to a set of symptoms caused by the complete deterioration of the immune system. At this stage, HIV has reached its most advanced phase, and once a person progresses to AIDS, the body is no longer able to fight off infections due to the loss of immune function.

HIV and AIDS are transmitted only through specific infected bodily fluids entering another person's bloodstream, such as genital fluids, blood, and breast milk. Transmission often occurs as a result of high-risk behaviors, including having multiple sexual partners without condom use, sharing needles contaminated with blood during drug use, tattooing, or piercing, as well as transmission from an infected mother to her baby during childbirth or breastfeeding (Purnamawari, 2016). According to Bappenas (2017), early HIV symptoms in both men and women typically appear a few days after exposure and may persist for 14–21 days. These symptoms can vary but commonly include prolonged fever, significant weight loss, reduced appetite, muscle and joint pain, sore throat, recurrent respiratory infections, swollen lymph nodes, chronic fatigue, persistent diarrhea, skin rashes, and night sweats.

The progression of HIV infection generally occurs in four stages. In the first stage, individuals typically do not experience symptoms aside from swollen lymph nodes. As HIV advances into the second stage, the immune system becomes increasingly compromised, resulting in mild symptoms such as itchy skin, fungal infections, and recurring respiratory infections. Stage three marks further progression of the virus, leading to moderate symptoms including drastic weight loss, prolonged diarrhea, and oral thrush. In the fourth stage, HIV

reaches its most severe phase, characterized by extreme weight loss, serious infections affecting the brain and other organs, skin cancers, and the emergence of multiple opportunistic diseases.

Management of HIV/AIDS involves the use of antiretroviral (ARV) therapy, which effectively slows the progression of the disease. Physicians monitor viral load and CD4 cell counts regularly to evaluate treatment response. CD4 levels are usually checked every three to six months, while viral load testing is conducted at the beginning of treatment and then every three to four months thereafter. HIV prevention efforts can be strengthened through the ABCDE strategy, which emphasizes abstaining from risky sexual behavior, maintaining mutual monogamy with one sexual partner, using condoms correctly during sexual intercourse, avoiding drug use, particularly injectable drugs, and acquiring accurate education and information about HIV transmission, prevention, and treatment. In addition to these measures, individuals are encouraged to avoid risky sexual activities, remain faithful to their partners, use condoms properly, refrain from drug use, and seek reliable information regarding HIV and its prevention (Purnamawari, 2016).

Method

This study employs a qualitative approach using the Social Network Analysis (SNA) method. Social Network Analysis is a technique used to examine relationships among individuals or organizations within a social network by analyzing the connections formed through direct or indirect communication and interaction among network members (Liu et al., 2020). In this research, SNA is applied to map and analyze the governance network involved in the HIV/AIDS response in Batam City. The analysis includes identifying key actors, measuring centrality, and examining the structure of the network.

Data collection was conducted through several stages. First, the researcher carried out an initial mapping of key actors involved in the HIV/AIDS response in Batam City. Second, structured interviews were conducted with these key actors, including representatives from the Health Office, the AIDS Commission, non-governmental organizations, and other relevant stakeholders. Third, field observations were undertaken to observe direct interactions among actors, document communication patterns, and understand the dynamics of their relationships. Secondary data were obtained from reports, regulations, and official documents related to HIV/AIDS prevention and control in Batam City.

Data analysis combined interview coding with network visualization using the UCINET–Netdraw software to identify and map the involvement of key actors and examine inter-actor relationships within the governance network for HIV/AIDS response in Batam City. The analysis process began with coding interview data, where each actor was assigned a numerical code, followed by the creation of an edge list table containing information on Actor 1, Actor 2, Type of Relationship, and Relationship Intensity. This table was then converted into an adjacency matrix as input for UCINET, which calculates centrality indicators, while Netdraw visualizes the network, with nodes representing actors and edges representing their relationships.

Centrality measurements were conducted to assess the influence and roles of actors within the network. These measurements include degree centrality, which identifies actors with the most connections; closeness centrality, which measures how quickly actors can reach others; betweenness centrality, which identifies actors who function as “bridges” connecting different groups; and eigenvector centrality, which assesses an actor’s influence based on the quality of connections with other influential actors (Liu et al., 2020). Interpretation of the findings involved analyzing the resulting network patterns, identifying central actors essential

for coordination, and detecting structural holes that may hinder effective collaboration in the HIV/AIDS response in Batam City.

Results and Discussion

Network Structure

The structure of power within a governance network can be understood as a complete network, offering a comprehensive overview of the interactions among the various elements involved. This network encompasses all actors who play a role and the relationships that connect them. Each individual or institution holds an interdependent position, collectively forming a system designed to address the issue effectively (Safitri et al., 2023). The following illustration presents the complete network involved in HIV/AIDS prevention and control in Batam City.

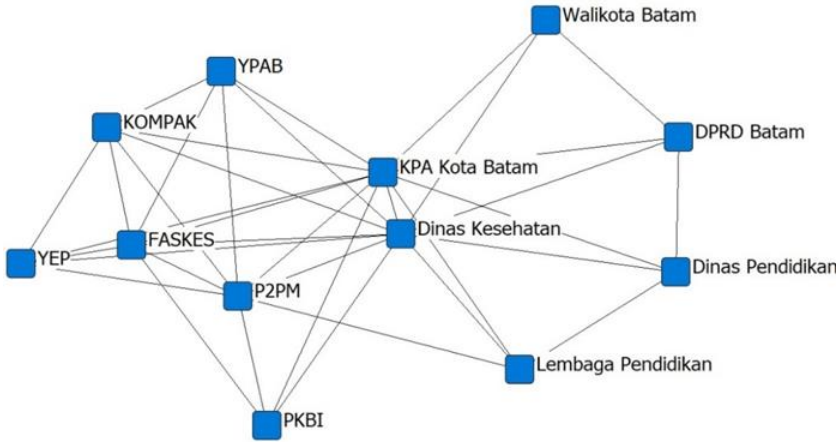

Figure 1. Complete Network
Source: Aplikasi Ucinet-NetDraw

Based on Figure 1, twelve actors are identified within the network, each of whom directly contributes to forming the network structure in the HIV/AIDS response in Batam City. The figure also illustrates which actors interact with one another and which actors are most frequently connected by others. The overall density level of the network involving the twelve actors is presented in the following table:

Table 1. Network Structure (Density)

	Average Value	STD Dev
Density	0,939	0,919

Source: Ucinet-NetDraw Application

The average density value reflects the effectiveness of interactions among actors in the network. Density represents the level of communication and collaboration among all actors. The maximum possible value is 1, indicating that all actors interact fully and maintain strong relationships. The average value represents the mean level of interaction among actors, while the standard deviation indicates how much the data deviates from the average, illustrating the variation in interaction intensity among actors in the network.

Key Actors

Key actors are individuals or institutions that play an essential role in disseminating information and influencing collaborative change within a network (Safitri et al., 2022). In this research context, Social Network Analysis (SNA) provides tools to identify such actors through various measurements. One of the most widely used indicators is degree centrality, which refers to the total number of connections or relationships a node—or actor—possesses within the network. Degree centrality shows how many actors an individual can directly reach, which is strongly related to access to information and knowledge.

As illustrated in Figure 1, the actor network in the HIV/AIDS response shows that several actors hold a significantly higher level of connectivity than others. This is further confirmed through degree centrality calculations. Theoretically, the more members a network has, the greater the number of connections that may form. Therefore, degree centrality is often expressed in normalized form so that comparisons remain meaningful regardless of population size.

Table 2. Degree Centrality Calculation

No.	Actor (Node)	Degree Centrality	Degree Centrality (Normalized)
1	Batam City Parliament (DPRD)	4	0.182
2	Mayor of Batam	3	0.136
3	Health Office	19	0.864
4	P2PM	16	0.727
5	Educational Institutions	6	0.273
6	Education Office	4	0.182
7	Batam AIDS Commission (KPA)	18	0.818
8	PKBI	8	0.364
9	YEP	10	0.455
10	YPAB	10	0.455
11	KOMPAK	12	0.545
12	Health Facilities (FASKES)	14	0.636

Source: UCINET NetDraw

Degree centrality values range from 0 to 1. A value of 0 indicates no interaction among actors, while a value of 1 represents complete connectivity, meaning all actors engage with one another. Regardless of the total number of actors in the population, normalized degree centrality values remain within this range.

The results in Table 2 show that the Batam Health Office and the Batam AIDS Commission (KPA) possess the highest degree centrality values, approaching 1. This indicates that they are the most central and influential actors within the HIV/AIDS governance network in Batam City. Their high level of connectivity reflects a pivotal role in coordinating activities, disseminating information, and facilitating inter-actor collaboration within the network.

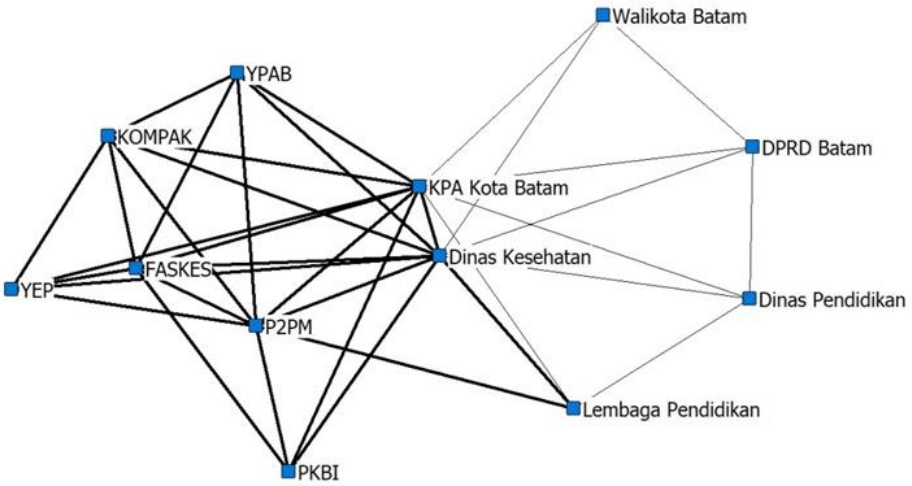

Figure 2. Degree Centrality Network Structure

Figure 2 illustrates the network structure analyzed using the degree centrality approach. The figure clearly shows that the Health Office and the Batam AIDS Commission (KPA) are the actors with the highest level of prominence within the network. This is evident from the large number of actors connected to both institutions, as well as from the values presented in Table 2, which document the number of direct ties associated with each actor. The higher the degree centrality value, the greater the representation and influence of an actor in the network.

Actors Connected to Resources

Actors connected to key resources can be analyzed through the magnitude of their eigenvector centrality values. Eigenvector centrality is used to identify the most influential actors in a network by considering not only the number of connections they possess but also the quality and importance of those connections. This measure helps explain how information and authority circulate within an organization or community.

The following table presents the eigenvector centrality values of actors involved in the HIV/AIDS response network in Batam City:

Table 3. Eigenvector Centrality Calculation

No.	Actor (Node)	Eigenvector Centrality
1	Batam City Parliament (DPRD)	0.074
2	Mayor of Batam	0.068
3	Health Office	0.406
4	P2PM	0.391
5	Educational Institutions	0.162
6	Education Office	0.081
7	Batam AIDS Commission (KPA)	0.395
8	PKBI	0.244
9	YEP	0.296
10	YPAB	0.296
11	KOMPAK	0.336
12	Health Facilities (FASKES)	0.369

Source: UCINET–NetDraw

Eigenvector centrality values can be used to strengthen collaboration among team members and identify new opportunities or potential risks arising from changes in network structure. Like other centrality measures, eigenvector values range from 0 to 1. These normalized values allow comparisons across networks regardless of size. Actors with higher scores are considered more influential because they are connected to other highly influential actors. In this context, the Health Office and the Batam AIDS Commission have the highest eigenvector values, indicating that they are the most resource-connected and influential actors in the network.

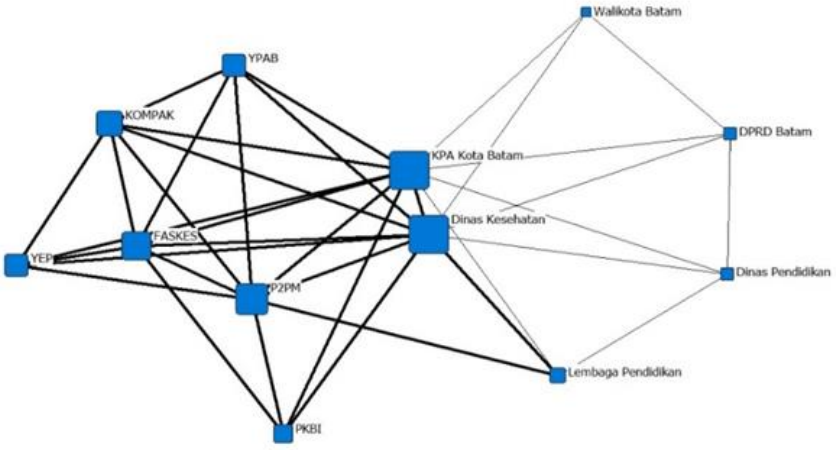

Figure 3. Eigenvector Centrality Network Structure
Source: UCINET–NetDraw

Understanding the position and influence of each actor enables more effective planning of activities and programs that leverage the network to achieve strategic goals. As shown in Table 3 and Figure 3, other actors hold significantly lower eigenvector centrality scores compared with the Health Office and KPA. This strengthens the conclusion that these two institutions represent the actors most strongly connected to resources within the HIV/AIDS governance network in Batam City.

Closeness Centrality

Closeness centrality refers to the measure of how near an actor is to all other actors in a network, based on the average length of the shortest paths connecting them. In other words, the higher an actor's closeness centrality value, the nearer their position is to all other actors in the network. Actors with high closeness centrality are able to access other actors more quickly compared to those with lower closeness scores.

Within network theory, closeness centrality not only identifies an individual's strategic position but also influences information flow, social interaction dynamics, and patterns of influence. Actors with high closeness scores often play a crucial role in accelerating the dissemination of information and facilitating cooperation among network members.

Table 4. Closeness Centrality Calculation

No.	Actor (Node)	Closeness Centrality	Closeness Centrality (Normal)	Closeness Measure
1	Batam City Parliament (DPRD)	0.36	1.00	18
2	Mayor of Batam	0.27	1.00	19
3	Health Office	1.73	0.79	11
4	P2PM	1.45	0.73	14
5	Educational Institutions	0.34	0.79	18
6	Education Office	0.36	0.58	18
7	Batam AIDS Commission (KPA)	1.64	0.55	11
8	PKBI	0.73	0.73	18
9	YEP	0.91	0.79	17
10	YPAB	0.91	0.78	17
11	KOMPAK	1.09	0.79	16
12	Health Facilities (FASKES)	1.28	0.55	15

Source: UCINET–NetDraw

The table above shows the closeness centrality values of each actor in the network. Unlike degree centrality, where higher values indicate a stronger position, closeness centrality is interpreted inversely: the lower the numerical value, the closer an actor is to all others in the network, and therefore the more strategically positioned they are. Lower values indicate that an actor can reach others with fewer steps, reflecting greater accessibility and influence.

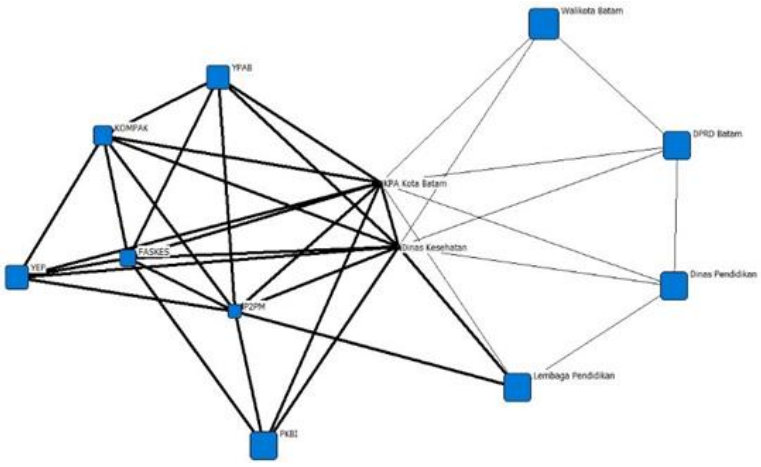

Figure 4. Closeness Centrality Network Structure
Source: UCINET–NetDraw

Based on Figure 4, closeness centrality appears to be inversely related to degree centrality. This pattern is confirmed in Table 4, which shows that the Freeman closeness scores for the Mayor of Batam and the Batam City Parliament (DPRD) are the highest. This is represented in the closeness centrality network structure, where their node sizes appear larger than those of other actors. Meanwhile, the Health Office and the Batam AIDS Commission (KPA), despite playing significant roles based on degree centrality, show relatively smaller

node sizes in the closeness centrality visualization. This indicates that they are positioned farther from the center when considering the shortest path distances within the network.

Betweenness Centrality

Betweenness centrality is an important measure used to assess the extent to which an actor functions as an intermediary or bridge between other actors within a network. This concept is considered crucial because it relates directly to the actor's ability to control, filter, or manipulate the flow of information (Eriyanto, 2014). Actors with high betweenness centrality hold a strategic position, as they often lie along the shortest paths connecting two or more other actors. Consequently, they possess substantial potential to influence communication and coordination within the network.

If such an actor were removed from the network, the connections between actors who rely on that intermediary could be disrupted, potentially causing significant effects on social dynamics within the network. Thus, measuring betweenness centrality is essential in various contexts, including social network analysis and collaborative governance. Understanding which actors play bridging roles provides valuable insight for designing effective communication and interaction strategies.

Table 5. Betweenness Centrality Calculation

No.	Actor (Node)	Betweenness Centrality	Betweenness Centrality (Normal)
1	Batam City Parliament (DPRD)	0.333	0.606
2	Mayor of Batam	0	0
3	Health Office	12.617	22.939
4	P2PM	2.617	4.758
5	Educational Institutions	0.333	0.606
6	Education Office	0.333	0.606
7	Batam AIDS Commission (KPA)	12.617	22.939
8	PKBI	0	0
9	YEP	0	0
10	YPAB	0	0
11	KOMPAK	0.200	0.364
12	Health Facilities (FASKES)	0.950	1.727

Source: UCINET–NetDraw

Betweenness centrality behaves similarly to degree centrality and closeness centrality in that its values may vary depending on the number of actors within the network. For this reason, scholars often recommend using normalized betweenness centrality values to allow comparisons independent of network size.

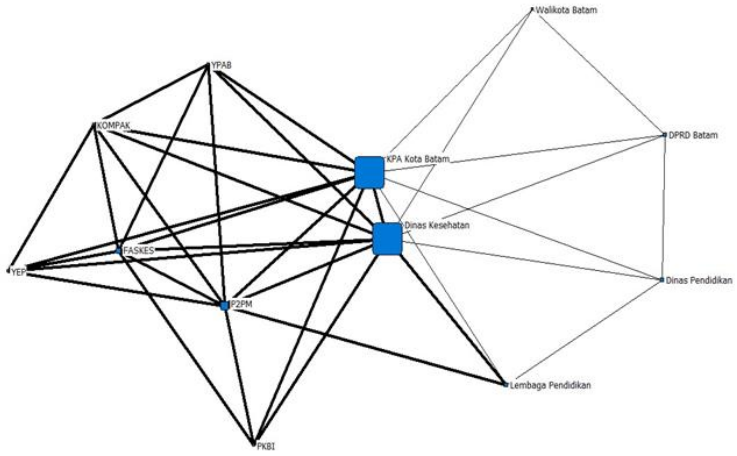

Figure 5. Betweenness Centrality Network Structure
Source: UCINET–NetDraw

Figure 5 reveals that the Batam AIDS Commission (KPA) and the Health Office are the actors with the highest betweenness centrality values. This is consistent with the normalized indicators in Table 5, which show that these two actors play the most significant intermediary roles in the HIV/AIDS governance network of Batam City. Their positions enable them to serve as bridges between different actor groups, facilitating communication, coordination, and information flow across the network.

Overall, the analysis of actor centrality demonstrates that the Batam AIDS Commission and the Health Office dominate central positions in the HIV/AIDS response network. Given their roles and influence, these actors must maintain strong relational ties and perform bridging functions among other members of the network. Furthermore, both institutions are expected to cultivate positive and collaborative relationships with other key actors to strengthen the overall governance structure and enhance the effectiveness of HIV/AIDS prevention and control efforts in Batam City.

Discussion

This study employed multiple analytical approaches to address questions related to the HIV/AIDS response in Batam City. The research identified key actors within the HIV/AIDS governance network, including those responsible for managing information and controlling essential resources. Using the Social Network Analysis (SNA) method, with a focus on centrality measures, the study revealed that twelve actors are involved either directly or indirectly in the network.

Drawing upon the concept of Network Governance as outlined by Etemadi et al. (2017), the study underscores the importance of understanding network structure and identifying central actors. The findings show that the Batam AIDS Commission (KPA) and the Health Office serve as the most central actors within the network, while other actors function primarily as supporting units in the collaboration process. Their centrality is reinforced by the legal authority granted through national regulations, positioning them as the principal institutions responsible for HIV/AIDS governance. Both organizations not only carry direct responsibilities but also serve as intermediaries between various actors, including the Education Office, NGOs, and educational institutions.

The authority of KPA and the Health Office is grounded in Provincial Regulation No. 15 of 2007 and the Ministry of Home Affairs Regulation No. 20 of 2007, which establish collaborative mechanisms among institutions involved in HIV/AIDS response efforts.

However, the absence of a city-level regulation (Perda) specifically outlining the roles and responsibilities of each stakeholder has resulted in fragmented and less effective coordination. Consequently, each actor continues to operate independently, such as Yayasan Embun Pelangi, which focuses on transgender populations; Yayasan Pembina Asuhan Bunda, which focuses on female sex workers; PKBI, which targets high-risk housewives; and Kompak, which provides support for people living with HIV/AIDS (PLWHA).

KPA Batam has proposed that the City Parliament (DPRD) issue a local regulation to formally define stakeholder roles, strengthen institutional authority, and improve the effectiveness of multi-actor collaboration. However, other actors, such as the Mayor, DPRD, the Education Office, and educational institutions, have not fully optimized their involvement due to broader responsibilities. The Mayor's attention is often directed toward general social welfare issues, while DPRD's focus on oversight and budgeting results in limited engagement in HIV/AIDS governance.

The Education Office has significant potential to develop educational programs related to HIV/AIDS prevention but is frequently constrained by competing educational priorities. Similarly, educational institutions could play an important role in raising awareness among youth but often face challenges related to stigma and resource limitations. The lack of strong collaboration and effective communication among these actors limits their contributions to the overall HIV/AIDS response in Batam City.

Conclusion

Based on the findings of this research using Social Network Analysis to examine the HIV/AIDS response network in Batam City, several conclusions can be drawn. First, network structure analysis shows that HIV/AIDS prevention and control efforts involve a diverse set of actors, including governmental and non-governmental organizations. Each actor carries distinct responsibilities, particularly in disseminating information and providing health services. However, a major challenge is the lack of program integration, which reduces the overall effectiveness of HIV/AIDS interventions in Batam City. Second, the study identifies key actors within the network. The Batam Health Office serves as the primary coordinator, followed by the Batam AIDS Commission and several NGOs specializing in advocacy and public education. The community also plays an essential role inraising awareness and supporting prevention efforts. The findings highlight that strong collaboration between all actors is crucial for achieving meaningful progress in HIV/AIDS prevention and control. Finally, with regard to coordination, although collaborative governance efforts exist, their implementation is often hindered by bureaucratic obstacles and fragmented programs. These barriers reduce the effectiveness of HIV/AIDS prevention strategies. Therefore, the application of Social Network Analysis is proposed as a more inclusive and responsive approach that allows for the integration of resources and perspectives from various actors, leading to more coherent and coordinated interventions. Overall, this research provides valuable insights into the dynamics of governance networks in the context of HIV/AIDS prevention in Batam City. It is expected that future efforts will be carried out in a more integrated and sustainable manner to reduce the spread of HIV/AIDS and strengthen collaborative capacity among stakeholders.

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