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The Gansu lead poisoning (PbP) incident: An ecosystemic autopsy

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Abstract
In July 2025, a mass lead-poisoning incident occurred at a private kindergarten in Tianshui City, Gansu Province, China, after children were served food adulterated with industrial pigments containing extremely high concentrations of lead (Pb). Medical screening confirmed abnormal blood lead levels in over 90% of the enrolled children, making it one of the largest childhood lead exposure crises in recent years. The goal of this paper is to present an ecosystemic autopsy (EcoA) of the event, examining its proximal causes, ecosystemic enablers, health consequences, and governance failures. The proximal cause was the deliberate use of non-food-grade pigments to alter the appearance of meals, purportedly motivated by financial gain. Contributing ecosystemic factors included institutional negligence, regulatory gaps in school food safety oversight, weak laboratory integrity, and unregulated access to toxic industrial substances through e-commerce platforms. The health implications for affected children are profound, as lead exposure is associated with irreversible neurocognitive, behavioral, and developmental harm. The incident also highlighted widespread mistrust of local governance, with allegations of data tampering and cover-up. Recommendations from the EcoA findings suggest the need for immediate medical monitoring, transparent retesting, stricter regulatory enforcement, laboratory accreditation reform, and long-term educational and psychosocial support for affected children. This Gansu PbP incident underscores the urgent need for ecosystemic reforms to prevent future environmental health crises in educational settings.

Keywords: Child health, ecosystemic autopsy (EcoA), food safety, gansu incident, lead poisoning (PbP)

Introduction

A recent and widely reported lead poisoning (PbP where Pb is the chemical symbol for the Lead element) incident in Tianshui City, Gansu Province, northwestern China, has drawn national and international attention. According to multiple sources [1, 2, 3], over 200 kindergarteners were found to have elevated blood lead levels (BLLs). The PbP scandal unfolded at Heshi Peixin Kindergarten (located in Maiji District), where 233 out of 251 enrolled children were confirmed to have high BLLs. In fact, based on reports from several news sources, 201 or more were hospitalized for follow-up checkups and medical care. Eventually, 247 children and 28 staff members were diagnosed with abnormal BLLs, prompting a widespread public outrage that resulted in an inevitable crisis of trust in local authorities [4].

The Gansu incident of PbP, which is also known medically as plumbism (a term first used in 1842 according to *Merriam-Webster Dictionary* [5] or saturnism [6], sparked intense scrutiny when details emerged about the cause. PbP remains one of the most preventable environmental health hazards, and yet even today, it continues to affect millions of people worldwide, especially children. It occurs when Pb, which is a toxic heavy metal element, builds up in the body, often through exposure to contaminated water, paint, soil, or household dust. Even small amounts of Pb can result in serious harm, such as severe developmental delays, challenging learning problems, and grave damage to vital organs (e.g., brain, heart, kidneys, and liver) [7]. Understanding the causes, effects, and prevention of PbP is vital for protecting vulnerable populations and promoting healthier communities. McCarthy and Jiang [3] reported that the children's lead exposure (PbE) stemmed from consuming meals that were tainted with industrial-grade, non-edible pigments used as food coloring by the preschool kitchen staff. These contaminated items included a tri-colored red date steamed cake and a corn roll with sausage, with Pb levels ranging between 1,052 and 1,340 mg/kg, up to 2,680 times higher than the national safety limit of 0.5 mg/kg permitted in China [8, 9, 10]. Following the treatment, children's BLLs dropped by approximately 40%, on average.

As the news broke, eight individuals, including the kindergarten principal, were detained for allegedly attempting to cover up the incident [3, 11]. Later investigations revealed deeper ecosystemic failures. According to Dang [2], 10 government officials were placed under investigation for oversight failures. Evidence showed that the Gansu Provincial Disease Control Agency and Tianshui Second People's Hospital had falsified blood test results, modifying data to show lower Pb levels than what was actually present [12]. The Gansu's provisional-level branch center of the Chinese Center for Disease Control and Prevention (CCDC; Chinese: 中国疾病预防控制中心) was also found to have mishandled the case by violating health regulations during sample collection, which caused major discrepancies in the reported results [12].

Beyond the immediate health impact, the PbP case exposed regulatory and ethical lapses. News reports indicate that the local education bureau had allowed the unlicensed kindergarten to operate without inspections for years. Some officials are suspected of accepting bribes from the investor of the private preschool, enabling the facility to bypass safety regulations [12].

Public anger mounted promptly. The PbP incident ignited renewed concerns over China's recurring food and environmental safety crises. In a swift response, the government launched a series of legal and administrative actions. According to Davidson [12] and Yang [13], several individuals, including the principal, the investor, and the

cooks, were under arrest. Investigations also extended to 27-28 individuals from local schools, hospitals, and government departments. A provincial task force was formed, with involvement from national health and environmental authorities, as well as disciplinary bodies under the State Council [11].

To address public outcry, the Gansu provincial government issued a formal apology and pledged to provide free medical care, rehabilitation, long-term monitoring, and legal assistance for affected families [11]. All related costs are being covered by a government-managed relief fund. Nevertheless, protests erupted outside the kindergarten, where clashes between parents and police were reported [12]. Public skepticism remains high, with many questioning the credibility of official test results and whether the food source was the sole contributor to the elevated BLLs [11, 12, 14]. Some parents sought independent testing, which revealed far higher Pb levels than those previously disclosed.

The PbP scandal has been described as "one of China's worst ever school food safety incidents" (para. 2) [12]. It has highlighted deep-rooted problems within the public health and education systems, including negligence, corruption, and institutional cover-ups. More broadly, it has intensified public concern over transparency, regulatory accountability, and the long-standing distrust in official health reporting [12].

Ecosystemic Autopsy: What and Why

1. What is Ecosystemic Autopsy (EcoA)?

The term ecosystemic autopsy (EcoA) is used by Chia [15] to distinguish it from psychological autopsy (PsychoA), which "is an investigative method used to understand and reconstruct an individual's psychological state, circumstances, and potential motives leading to his/her death, especially in cases of suicide or mysterious deaths where psychological factors might be relevant" (para. 4) [15]. According to Chia [15], "it is crucial because ecosystemic autopsy helps identify and understand the complex web of factors that might have played a role, offering insights for prevention and intervention strategies to better support individuals at risk and improve mental health services" (para. 5).

In other words, the EcoA is a conceptual and analytical framework used to investigate complex, multi-causal crises by examining the interrelated ecosystems that contribute to their emergence, escalation, and aftermath. Rooted in the Bronfenbrennerian ecosystems theory, the EcoA approaches a crisis not as an isolated or random event, but as a symptom of deeper ecosystemic dysfunctions across ecological, institutional, sociopolitical, and cultural domains [16, 17]. This investigative method draws on interdisciplinary perspectives, integrating insights from public health, sociology, political ecology, and governance studies to map out the layered interactions that sustain structural risk and vulnerability. In essence, an EcoA treats the crisis as a 'body' whose 'failure' or 'death' must be understood by analyzing not only the immediate 'cause of the unfortunate incident or death' but also the long-term pathological sufferings, risk exposures, and breakdowns in regulatory and institutional 'organs' (e.g., local education authority, school and hospital) that enabled it.

Unlike conventional investigative approaches that often isolate human error or legal culpability, the EcoA broadens the scope of investigation to include ecosystemic inertia, regulatory capture, institutional decay, and environmental degradation as co-contributors to harm. For instance, in the case of environmental health disasters, such as lead poisoning in Gansu [8] this year and mercury poisoning in Minamata in 1956 [18], this method would scrutinize how urban planning, industrial policy, food safety regimes, and local governance failures collectively co-produce conditions of toxic exposure [19]. Moreover, it also considers historical patterns of marginalization, underfunded public health systems, and bureaucratic complicity in concealing or downplaying harm, rather than viewing such incidents as anomalies or 'bad apple' problems. This holistic post-crisis analysis facilitates structural learning and reform, rather than mere crisis management or scapegoating.

Furthermore, the EcoA approach emphasizes temporal depth and scalar complexity. It acknowledges that ecosystemic failures often accumulate over time and are embedded across various levels of governance, i.e., from local enforcement gaps to national policy failures. This perspective aligns with Foucault's [16] notion of governmentality, where state power operates through decentralized institutions that shape populations not only through laws but through normalization, surveillance, and knowledge production. Therefore, falsified medical data, unregulated educational facilities, and corrupt licensing procedures are not mere random violations, but predictable outcomes of ecosystemic weaknesses that must be anatomized to prevent future recurrence. The value of an EcoA lies in its capacity to reveal the 'hidden injuries' of institutional failure and to propose interventions that are preventive, not just corrective.

2. What are the steps to be taken in Ecosystemic Autopsy (EcoA)?

Conducting an EcoA involves a structured, multi-step process designed to diagnose the complex ecosystems-level failures behind a preventable crisis, such as the Gansu lead poisoning (PbP) incident. This approach draws from the Ecological Systems Theory [17], public health investigation protocols [20], and critical governance analysis [16], offering a ecosystematic framework for uncovering how interrelated forces contribute to harm. Below are the key steps involved, each explained in more details.

Step 1: Define the Scope and Objectives

The first step in conducting an EcoA is to clearly define the scope of its investigation as well as its primary objectives. This involves identifying the specific incident or crisis to be analyzed, such as a toxic exposure, environmental disaster, or public health failure, and determining the intended outcomes, whether they be diagnostic, reform-oriented, or policy-informing. In the Gansu PbP incident, the EcoA would focus on uncovering the ecosystemic and institutional dynamics that had allowed over 200 children to be exposed to extreme levels of Pb in a school setting. This initial step ensures clarity in focus and frames the autopsy not as a blame-seeking exercise, but as a structural analysis aimed at accountability and prevention [20].

Step 2: Construct a Multi-Level Analytical Framework

Once the scope of investigation has been clearly defined, the next step is to adopt a theoretical framework for analyzing ecosystemic interactions. Most EcoAs employ the Ecological Systems Theory [17], which delineates five

interdependent levels: Level#1-microsystem, Level#2-Mesosystem, Level#3-Exosystem, Level#4-Macrosystem, and Level#5-Chronosystem. This five-level framework allows investigators to map how factors at each level, ranging from direct institutional settings to cultural norms and historical legacies, to interact to produce harm. In the Gansu case, this would include assessing direct exposure through school meals (Microsystemic level), communication failures between hospitals and families (Mesosystemic level), local governance lapses (Exosystemic level), national regulatory culture (Macrosystemic level), and repeated public health scandals over time (Chronosystemic level).

Step 3: Collect and Triangulate Data from Diverse Sources

An effective EcoA relies on gathering multi-source, cross-sectoral data to piece together an accurate and comprehensive picture of what happened. This step involves collecting data from primary sources (e.g., medical records, regulatory filings, school logs), secondary reports (e.g., news media, investigative journalism), and stakeholder testimony (e.g., families, health workers, educators). In the Gansu incident, this would include analyzing official health test results, independent laboratory findings, whistle-blower accounts, media exposés, and policy documents. Data triangulation ensures reliability and also helps to identify discrepancies, e.g., the falsification of blood lead level (BLL) reports by government institutions [12].

Step 4: Analyze Ecosystemic Interactions at Each Ecological Level

With data in place, the EcoA proceeds systematically in analyzing how actions and failures at each ecological level contributed to the crisis. This analysis should emphasize the inter-level dynamics, i.e., how the Exosystem-level corruption (e.g., bribed licensing authorities) influenced the Microsystem-level exposure (e.g., toxic food served at school), and so on. It should also trace feedback loops, where institutional cover-ups further erode public trust and worsen outcomes. For instance, the Gansu incident showed how falsified medical reports (Mesosystemic/Exosystemic level) exacerbated parent outrage and triggered broader institutional distrust (Macrosystemic level), which in turn influenced the government's delayed response (Chronosystemic level).

Step 5: Identify Patterns, Root Causes, and Structural Vulnerabilities

Once ecosystemic interactions are mapped, the next step is to interpret the EcoA findings to identify root causes, recurring patterns, and points of vulnerability within and across ecosystems. This analysis goes beyond identifying individual failures to reveal structural problems, e.g., institutional impunity, regulatory capture, or knowledge suppression. In the Gansu incident, the root causes included lack of enforcement of food safety regulations, unregulated private education sectors, and widespread data manipulation by health agencies. Identifying these root causes enables a shift from reactive punishment to proactive reform [19].

Step 6: Formulate Multi-Level Recommendations for Reform

After diagnosing the ecosystemic issues, the EcoA culminates in the development of evidence-based, multi-level interventions. Recommendations should target changes at each level of the ecosystem: improving hygiene protocols and food sourcing at the school level (Microsystemic level), strengthening inter-agency coordination (Mesosystemic level), enforcing government oversight and whistle-blower protections (Exosystemic level), reforming national regulatory systems (Macrosystemic level), and learning from past crises to develop resilient, long-term public health strategies (Chronosystemic level). Effective reform must be integrated, addressing the ecosystem as a whole rather than treating isolated symptoms [20].

Step 7: Disseminate Findings Transparently and Engage Stakeholders

Finally, the EcoA process concludes with the transparent dissemination of findings and engagement with all relevant stakeholders, i.e., community members, policymakers, researchers, and affected parties. This stage is crucial for restoring public trust and ensuring accountability. In the Gansu incident, transparency could have mitigated public outrage by demonstrating that ecosystemic failures, not just individual negligence, were being addressed. Public dialogue informed by a well-conducted EcoA can pressure institutions to implement structural change, and empower communities to demand safety and justice [16].

3. Why the need to conduct an Ecosystemic Autopsy?

Theoretically speaking, conducting an EcoA of the Gansu lead poisoning (PbP) incident is essential for uncovering the complex and interwoven factors that contributed to this preventable public health crisis. Unlike traditional investigations that often focus narrowly on individual blame or immediate causes, the EcoA offers a broader, ecosystemic lens through which to analyze the underlying social, political, regulatory, institutional, and environmental dynamics. This holistic approach enables investigators to trace how multiple layers of failure, such as weak governance, corruption, inadequate regulatory oversight, and compromised public health infrastructure, interacted to allow a large-scale toxic exposure to unfold and remain unaddressed. By examining interdependencies (e.g., the unlicensed status the private kindergarten in the Gansu incident, and the falsification of blood test data by state agencies), the EcoA identifies not only proximate missteps but also deeper patterns of dysfunction that reveal ecosystemic vulnerabilities. It also provides insight into how public trust erodes over time, emphasizing the need for lasting, structural reforms that strengthen health resilience and institutional accountability, especially in environments prone to ecosystemic risk.

Within the context of the Gansu PbP incident, this paper applies the EcoA framework to investigate how seemingly separate issues (e.g., the illegal operation of the private kindergarten, the deliberate use of industrial-grade pigments in food preparation, the manipulation of medical data by public health authorities, and the ensuing collapse of public confidence) are in fact interconnected within a larger web of ecosystemic failure [4]. Rather than treating each breakdown as an isolated event, the EcoA enables a comprehensive mapping of the ecosystem of dysfunctions that together

facilitated a severe violation of child safety and public health. This integrated analysis not only deepens understanding of how such a crisis was allowed to happen, but also provides a more robust foundation for developing meaningful accountability mechanisms and long-term preventative reforms.

An Application of Ecosystemic Autopsy (EcoA) in the Gansu PbP Incident

To fully understand the complex failures that led to the 2025 lead poisoning (PbP) incident in Tianshui City, Gansu Province, the author of this paper conducted a theoretical EcoA based on the news reports taken from various sources. The EcoA was conducted using the five levels of the Ecological Systems Theory [17]. This model offers a framework for examining how multiple, interdependent ecosystems, ranging from individual to societal, interact to produce ecosystemic harm. In the Gansu case, where over 200 kindergarteners were diagnosed with elevated blood lead levels due to toxic food exposure, this approach enables a comprehensive post-crisis analysis that extends beyond identifying immediate causes. Each ecosystemic level uncovers deeper structural failures that contributed to the tragedy [4].

1. Microsystemic Level

1.1. Definition: At this level, the Microsystem encompasses the immediate environments in which individuals directly interact, such as families, schools, and peer groups [17].

1.2. What to look for: The focus of Microsystem is on the direct experiences of the children and staff within the kindergarten setting. Investigators would examine the day-to-day practices, interpersonal relationships, and physical conditions.

1.3. Example from the Gansu Incident: At Heshi Peixin Kindergarten, the children were directly exposed to lead through food provided by the school kitchen. Meals were found to contain industrial-grade, non-edible pigments (e.g., those used in the tri-colored red date steamed cake and sausage corn roll) which had lead (Pb) levels up to 2,680 times the legal limit [10]. The use of such ingredients within the immediate environment of the school shows a profound failure at the Microsystemic level, where children were endangered by those entrusted with their care.

2. Mesosystemic Level

2.1. Definition: At the Mesosystemic level, this ecosystem refers to the interactions between two or more Microsystems [17], such as the relationship between the school and parents or between healthcare providers and families.

2.2. What to look for: Analysts should examine how communication and collaboration, or lack thereof, between Microsystems contributed to harm. Were concerns shared, acted upon, or silenced?

2.3. Example from the Gansu Incident: Parents reportedly raised concerns when children showed symptoms of illness. However, these concerns were either ignored or met with misinformation. Health facilities, e.g., Tianshui Second People's Hospital, part of the Mesosystem, falsified blood test results to show lower Pb levels than were actually present, thereby severing the necessary trust and coordination between families and health institutions [12]. This breakdown in inter-institutional relationships prevented timely intervention and fueled public outrage [4].

3. Exosystemic Level

3.1. Definition: At this level, the Exosystem includes institutions and structures that indirectly affect individuals (e.g., local government agencies, media, and regulatory bodies) [17].

3.2. What to look for: Also at this level, the attention turns to how decisions made by officials and organizations, without direct interaction with the children, shaped the conditions of exposure.

3.3. Example from the Gansu Incident: Several Exosystemic failures were evident [4]. The local education bureau allowed the kindergarten to operate unlicensed for years, bypassing necessary inspections [12]. Government bodies such as the Gansu Provincial Disease Control Agency and the provincial branch of the Chinese CDC violated protocols during sample collection and engaged in data manipulation [12]. These actions, though removed from the children's daily lives, directly impacted their exposure risk and obstructed the ability of the public ability to respond to the crisis.

4. Macrosystemic Level

4.1. Definition: At this level, the Macrosystem includes overarching societal values, ideologies, policies, and cultural norms that shape lower-level ecosystems [17].

4.2. What to look for: Here, the analysts explore how national policies, economic incentives, or sociopolitical cultures foster ecosystemic neglect or injustice.

4.3. Example from the Gansu Incident: China has faced multiple food safety scandals in the past, revealing enduring challenges in enforcing health regulations across its vast territory. The use of industrial pigments in food reflects broader ecosystemic failures tied to profit-driven practices, weak regulatory enforcement, and a culture of corruption or impunity in some regions [4, 19]. Additionally, the prioritization of local economic development over public health, an enduring trait of the mainland Chinese political-economic Macrosystem, may have incentivized officials to overlook violations in favor of maintaining appearances [11].

5. Chronosystemic Level

5.1. Definition: At this fifth level, the Chronosystem considers the dimension of time, which includes life transitions, historical events, or ecosystemic changes over time [17].

5.2. What to look for: This Chronosystemic level evaluates the long-term trends and sequences of events leading up to and following the crisis. Two key questions to ask

are: (i) How did institutional behaviors evolve?; and (ii) How have past incidents shaped current responses?

5.3. Example from the Gansu Incident: China's recurring food and health scandals, including the 2008 melamine-tainted milk crisis [21], provide a historical backdrop to the Gansu incident. Despite previous reforms, the re-emergence of such incidents suggests a failure to implement lasting structural change. The Gansu case reflects not an isolated error but a continuation of ecosystemic dysfunction over time, where accountability measures are often reactive and short-lived [3]. Moreover, the decision to falsify results and cover up evidence mirrors past patterns of institutional behavior, reinforcing public distrust.

Table 1: Ecosystemic Autopsy of the Gansu PbP Incident

Level	Definition	Key Focus	Examples from the Gansu Incident
Microsystem	Immediate environment of the child	Daily exposure, interpersonal relationships	Contaminated food in kindergarten; direct poisoning via meals
Mesosystem	Interactions between Microsystems	School-healthcare-parent coordination	Hospitals falsifying tests; parents' concerns ignored
Exosystem	Indirect environments impacting individuals	Local government, regulatory agencies, media	Unlicensed school operation; health agencies manipulating test results
Macrosystem	Cultural values, norms, ideologies	National policy, economic systems, cultural patterns	Weak food safety culture; corruption; prioritization of profit over safety
Chronosystem	Dimension of time and systemic change	Historical patterns, long-term institutional behavior	Repetition of past scandals; reactive rather than preventive policy reform

Conclusion

What the Ecosystemic Autopsy (EcoA) uncovered

The EcoA of the unfortunate Gansu PbP incident reveals a ecosystemic failure across all levels of the ecosystemic or ecological model. At the Microsystemic level, the preschoolers were directly harmed by food prepared within a trusted institution. At the Mesosystemic level, communication failures and institutional deception prevented an early detection of PbP. The Exosystem showed glaring regulatory failures as well as institutional corruption, while at the Macrosystemic level, the incident illustrated the cultural and economic forces that enable such incidents to take place. Finally, at the Chronosystemic level, it also revealed how the repetition of past patterns can continue to endanger public health, despite reforms. This comprehensive lens exposes the PbP incident not as a one-off scandal, but as a manifestation of an entrenched structural dysfunction that requires an urgent overhaul.

While the author of this paper acknowledged that the application of EcoA as an investigating tool offers several advantages, it also has its own limitations. Both the advantages and limitations of the EcoA tool are briefly discussed below.

Advantages and Limitations of Ecosystemic Autopsy

Advantages: The EcoA provides a multi-layered, comprehensive understanding of crises, moving beyond blame to illuminate how its varied ecosystems interact with each other to create vulnerability [17]. The approach helps to identify the root causes, ecosystemic patterns as well as intervention points for a sustainable reform. By incorporating both historical and cultural analyses, the EcoA can also foster an invaluable long-term learning rather than short-term solutions to fix the PbP issue.

Limitations: The EcoA can be rather complex and resource-intensive. This is because the approach requires interdisciplinary knowledge and extensive data collection. Moreover, it may also face resistance from institutions that are unwilling to confront deep-rooted problems or cede control to independent investigators. In addition, while the EcoA excels at diagnosing the contending issue, it still falls short on prescribing specific policy solutions without any complementary technical expertise.

Finally, while the EcoA is not without its challenges, its value lies in its capability to reveal the deeper, interconnected causes of ecosystemic crises that are often obscured by reactive or constrained approaches. In the Gansu PbP incident, this method has illuminated not just what failed, but why those failures occurred across multiple ecosystemic levels, highlighting the urgent need for coordinated, cross-sectoral reforms. By shifting the focus from individual culpability to ecosystemic accountability, the EcoA offers a powerful tool for better understanding and preventing future repetitions of such a public health disaster.

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