

## Case Report

# Pediatric Hepatic Abscess in a Resource-Limited Setting: A Case Report

Adinda Paramitha Sukma Damayanti<sup>1</sup>, Khalisah Nurjihany Salsabila<sup>1</sup>, Bethseba Brontang Pulinggomang<sup>2</sup>

<sup>1</sup>General Practitioner, Kalabahi General Hospital, Alor, East Nusa Tenggara, Indonesia

<sup>2</sup>Pediatrician, Kalabahi General Hospital, Alor, East Nusa Tenggara, Indonesia



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e-ISSN: 2830-5442

**Corresponding author:**

Adinda Paramitha Sukma Damayanti  
adindadama12@gmail.com

**Published:**

30<sup>th</sup> November 2025

**DOI:**

<https://doi.org/10.58427/apghn.4.4.2025.189-200>

**Citation:**

Damayanti APS, Salsabila KN, Pulinggomang BB. Pediatric hepatic abscess in a resource-limited setting: a case report. *Arch Pediatr Gastr Hepatol Nutr.* 2025;4(4): 189-200

**Abstract:**

**Background:** Liver abscess is a rare but serious pediatric infection, more common in developing regions where malnutrition, poor sanitation, and limited healthcare access increase risk. It is broadly classified into pyogenic and amoebic types, with the latter more prevalent in tropical areas. Symptoms such as fever, abdominal pain, and hepatomegaly are often nonspecific, making diagnosis difficult in low-resource settings. Ultrasound plays a crucial role when advanced diagnostics are unavailable. This case illustrates these challenges in a remote hospital in Eastern Indonesia.

**Case:** A 13-year-old boy presented with right upper quadrant pain, intermittent fever, and hepatomegaly. Ultrasound revealed a 7 × 6 cm hepatic abscess. He received empiric intravenous antibiotics, but due to limited facilities for image-guided drainage, exploratory laparotomy with abscess evacuation was performed. The patient showed steady postoperative improvement, was discharged in good condition, and achieved full recovery on follow-up.

**Discussion:** This case illustrates how resource availability influences diagnostic and therapeutic decisions for pediatric liver abscess. Although ultrasound-guided drainage is the preferred minimally invasive approach, the absence of interventional radiology services required surgical management. The patient's improvement with empiric antibiotics and intraoperative findings supported a pyogenic etiology, underscoring the value of clinical judgment when microbiological testing is unavailable. In settings such as Eastern Indonesia, early imaging and timely empiric treatment remain crucial to guide care despite limited diagnostic resources.

**Conclusion:** Pediatric liver abscess can still be effectively managed in low-resource settings through prompt diagnosis, empiric therapy, and timely surgical intervention.

**Keywords:** pediatric hepatic abscess, pyogenic liver abscess, resource-limited setting, ultrasonography

## Introduction

Liver abscess is an uncommon but potentially life-threatening infection in children. Although its incidence is low in developed countries, it remains a significant cause of morbidity in developing regions, particularly where poor sanitation, malnutrition, and limited access to healthcare persist. Timely diagnosis and prompt intervention are essential to prevent severe complications such as rupture, sepsis, or peritonitis.<sup>1,2</sup>

Two major types of hepatic abscess are recognized: pyogenic and amoebic. Pyogenic liver abscess (PLA) is more common in children and usually results from bacterial infection, while amoebic liver abscess (ALA) is caused by *Entamoeba histolytica*, prevalent in tropical regions. Infections may spread through the portal vein from intra-abdominal sources or via hematogenous dissemination, and risk factors such as immunodeficiency, malnutrition, and biliary abnormalities further increase susceptibility.<sup>3,4</sup>

Clinical manifestations are often nonspecific, with fever, right upper quadrant pain, and hepatomegaly being the most common features. Laboratory findings typically reveal leukocytosis and elevated inflammatory markers but are not diagnostic. Imaging, particularly ultrasonography, remains the cornerstone for early detection, showing hypoechoic or mixed-echoic hepatic lesions. However, early abscesses can mimic cysts or hepatic tumors, posing diagnostic challenges, especially in resource-limited settings where CT or MRI is unavailable.<sup>1,2</sup>

This case report presents a pediatric hepatic abscess initially suspected as a cystic or neoplastic lesion in a child from a remote hospital in Alor, Indonesia, highlighting the importance of clinical suspicion and ultrasound-based diagnosis in resource-constrained environments.

## Case

A 13-year-old boy was brought to the Emergency Department of Kalabahi Hospital, Alor, East Nusa Tenggara, Indonesia, with a primary complaint of right upper quadrant abdominal pain for the past six days, which had worsened within the last five hours before admission. The pain was described as a constant, pressing discomfort localized to the right upper abdomen, not radiating, and aggravated by movement or palpation. The pain was associated with intermittent high-grade fever, particularly occurring at night, that responded poorly to over-the-counter analgesics. The patient's mother reported that he appeared weak and had reduced appetite since the onset of symptoms. Two episodes of vomiting occurred before hospital admission, consisting of non-bilious, non-bloody content. He denied abdominal distension, yellowish discoloration of the eyes or skin, diarrhea, bloody stools, or any history of trauma.

The patient had no significant past medical history and had never been hospitalized before. There was no history of chronic illness, previous abdominal infection, or trauma. His only medication prior to admission was ibuprofen, taken occasionally for fever. There was also no known family history of liver disease, jaundice, malignancy, or similar illness among close relatives. He was the second of three siblings, born at home and reportedly cried immediately after birth, with no complications during delivery. Growth and development were appropriate until the onset of the current illness. The patient's immunization history was incomplete, as his mother could not recall which vaccines had been administered. Nutritional assessment showed malnutrition. His diet mainly consisted of rice with fish or chicken and occasional vegetables. He lived with his parents and two siblings in a rural area of Alor, where sanitation and hygiene were poor. The family used refillable water for drinking and well water for bathing, with an outdoor bathroom and open waste burning.

Upon arrival at the emergency department, the patient appeared alert but febrile, with a temperature of 38.4°C. His blood pressure was 114/57 mmHg, pulse rate 85 beats per minute, respiratory rate 22 per minute, and oxygen saturation 97% on room air. Anthropometric measurements showed a body weight of 30.5 kg and height of 155 cm, corresponding to below the 5th percentile for both weight-for-age and height-for-age. The percentage of ideal body weight was 53%, consistent with a diagnosis of severe malnutrition.

On physical examination, the abdomen appeared flat and symmetrical overall, with slight fullness of the right upper quadrant compared to the left, suggesting hepatomegaly. Palpation revealed marked tenderness over the right upper quadrant with the liver palpable 4 cm below the right costal margin. The liver edge was smooth, with a firm consistency and mild tenderness. There was no splenomegaly, ascites, or shifting dullness. Bowel sounds were normal. Cardiopulmonary and neurological examinations were within normal limits.

Based on the presence of hepatomegaly with localized tenderness and the absence of jaundice or generalized abdominal distension, initial differential diagnoses included hepatic cyst, hepatoma, and hepatic abscess. Further investigations were performed to differentiate between cystic, neoplastic, and infectious causes of hepatic enlargement. Initial laboratory testing was obtained to support this diagnostic evaluation, and the findings are summarized in **Table 1**.

**Table 1.** Initial laboratory results of the patient at admission.

| Parameter                   | Result                     | Reference Range                | Interpretation                        |
|-----------------------------|----------------------------|--------------------------------|---------------------------------------|
| <b>Complete Blood Count</b> |                            |                                |                                       |
| Leukocytes                  | 17.6 × 10 <sup>3</sup> /μL | 4.0–11.0 × 10 <sup>3</sup> /μL | High (leukocytosis)                   |
| Neutrophils                 | 86%                        | 40–70%                         | High (neutrophil predominance)        |
| Hemoglobin                  | 13 g/dL                    | 12–16 g/dL                     | Normal                                |
| Hematocrit                  | 37.8%                      | 36–46%                         | Normal                                |
| Platelets                   | 303 × 10 <sup>3</sup> /μL  | 150–450 × 10 <sup>3</sup> /μL  | Normal                                |
| <b>Liver Function Tests</b> |                            |                                |                                       |
| SGOT (AST)                  | 27 U/L                     | < 40 U/L                       | Normal                                |
| SGPT (ALT)                  | 10 U/L                     | < 41 U/L                       | Normal                                |
| Total Bilirubin             | 1.24 mg/dL                 | 0.3–1.2 mg/dL                  | Slightly elevated                     |
| Direct Bilirubin            | 0.25 mg/dL                 | < 0.3 mg/dL                    | Normal                                |
| Indirect Bilirubin          | 0.99 mg/dL                 | < 1.0 mg/dL                    | Normal (upper limit)                  |
| <b>Renal Function Tests</b> |                            |                                |                                       |
| Urea                        | 27 mg/dL                   | 10–50 mg/dL                    | Normal                                |
| Creatinine                  | 1.0 mg/dL                  | 0.6–1.2 mg/dL                  | Normal                                |
| <b>Urinalysis</b>           |                            |                                |                                       |
| Protein                     | +2                         | Negative                       | Proteinuria                           |
| Leukocytes                  | +2                         | Negative                       | Pyuria                                |
| Erythrocytes                | +3                         | Negative                       | Hematuria                             |
| <b>Other Tests</b>          |                            |                                |                                       |
| Random Blood Glucose        | 139 mg/dL                  | < 140 mg/dL                    | Normal–High (pre-prandial borderline) |

Abdominal ultrasonography revealed a well-circumscribed hyperechoic lesion in the right hepatic lobe, measuring  $7 \times 6$  cm, with smooth borders, no nodularity, and absence of internal or peripheral vascularization on color Doppler. No intrahepatic or extrahepatic bile duct dilatation was noted. The sonographic impression was consistent with a hepatic abscess (**Figure 1 and Figure 2**). A plain abdominal radiograph (BNO) revealed a well-defined opacity projected over the right 10th posterior intercostal space, suggestive of hepatomegaly with no evidence of air-fluid levels or bowel obstruction (**Figure 3**).



**Figure 1.** Abdominal ultrasonography showing a well-defined hyperechoic lesion in the right hepatic lobe, measuring approximately  $7 \times 6$  cm.



**Figure 2.** The lesion appears with smooth margins and no internal vascularization



**Figure 3.** Plain abdominal radiograph showing a well-defined opacity over the right upper quadrant, consistent with hepatomegaly and suggestive of a hepatic lesion.

The patient was admitted to the pediatric ward with a working diagnosis of hepatic abscess. Initial management included intravenous fluid therapy for rehydration and maintenance. On hospital day 2, empiric parenteral antibiotics—ceftriaxone and

metronidazole—were initiated to cover both pyogenic and amoebic etiologies, in accordance with local practice in settings without microbiological diagnostic support. Supportive therapy consisted of ketorolac for pain control, ranitidine for gastric protection, and ondansetron for antiemetic support.

Due to the large abscess size ( $7 \times 6$  cm) and the absence of facilities for percutaneous drainage, the surgical team decided to perform an exploratory laparotomy with abscess drainage. Intraoperatively, a well-formed abscess cavity was identified in the right hepatic lobe, containing thick yellowish purulent fluid with a mild reddish tinge, containing thick yellowish purulent fluid with a mild reddish tinge, consistent with purulent material mixed with a small amount of blood. Approximately 70 mL of pus was evacuated. The cavity was thoroughly irrigated with warm normal saline until the effluent became clear, and a surgical drain was placed for postoperative monitoring. Surrounding structures revealed inflammatory changes involving the pancreas with edema of adjacent tissue and a periduodenal–retropancreatic hematoma, suggesting local inflammatory extension. The gallbladder and bile ducts appeared intact, with no bile leakage or perforation. Hemostasis was achieved, and the abdomen was closed in layers after drain placement. The patient tolerated the procedure well and was transferred to the pediatric ward for further management.

On postoperative day 1, the drain site was clean and covered with a sterile dressing. No pus or wound leakage was noted, and the drain produced approximately 200 mL of serosanguinous fluid within 24 hours. By postoperative day 2, the drain output had decreased to about 80 mL/24 hours, and there was no evidence of bleeding or recurrent collection. On postoperative day 3, the surgical drain was removed after output further declined and the wound remained dry and intact. The patient showed progressive clinical improvement, was afebrile, tolerated oral feeding well, and ambulated independently. On postoperative day 4, the patient was discharged home in good condition with oral antibiotics and scheduled follow-up.

However, on postoperative day 10, the patient returned to the emergency department with complaints of purulent discharge and partial wound dehiscence at the laparotomy site. On physical examination, localized erythema and purulent drainage were noted at the incision site, without evidence of systemic sepsis. Laboratory investigations revealed a white blood cell count (WBC) of  $12.6 \times 10^3/\mu\text{L}$ , hemoglobin 8.1 g/dL, hematocrit 24.0%, and platelet count  $340 \times 10^3/\mu\text{L}$ .

These findings were consistent with a resolving infection accompanied by mild microcytic anemia, likely secondary to chronic inflammation and recent surgical blood loss. The patient remained hemodynamically stable but febrile, although clinically in good condition. He was readmitted for further management, including wound care and optimization of antibiotic therapy. Daily wound dressing and close monitoring

were performed throughout hospitalization, with progressive clinical improvement observed within 48 hours. The patient was discharged after two days of inpatient treatment with continued oral antibiotics and wound care instructions. Follow-up on postoperative days 16 and 20 revealed complete wound healing, satisfactory nutritional progress, and no residual pain or infection.

## Discussion

The liver is a vital organ with a dual blood supply, predisposing it to an increased risk of infection. While the incidence of pyogenic liver abscess (PLA) has declined in developed countries, it remains relatively common in developing regions. The two major types of liver abscess are pyogenic and amebic, with PLA arising from biliary, portal, arterial, traumatic, or cryptogenic origins.<sup>3,5,6</sup>

Liver abscess develops as a result of infection of the liver parenchyma via several routes, including ascending infection through the bile duct (acute cholangitis), spread through the portal vein or hepatic artery, and direct invasion following gastrointestinal tract trauma (such as perforation from fish or chicken bones). Predisposing factors for liver abscess include advanced age, male sex, history of malignancy, chronic alcohol consumption, diabetes mellitus, inflammatory bowel disease, liver cirrhosis, prior endoscopic sphincterotomy, immunocompromised states, and the use of proton pump inhibitors.<sup>3,5</sup>

Pyogenic liver abscess (PLA) is the most common hepatic abscess in children, accounting for most reported cases. Meanwhile, the incidence of amebic liver abscess (ALA) has decreased due to improved sanitation and antiparasitic use. Pediatric PLA is commonly linked to bacteremia from gastrointestinal or biliary infections. Studies in Asia report *Klebsiella pneumoniae* and *Staphylococcus aureus* as the leading pathogens, highlighting the need for early detection, especially where microbiological testing is limited.<sup>4</sup>

In differentiating pyogenic from amebic liver abscess in resource-limited settings, macroscopic characteristics of the drained material can provide valuable diagnostic clues when microbiological confirmation is unavailable. Pyogenic liver abscesses typically contain thick, yellowish purulent pus, reflecting the accumulation of neutrophils, bacteria, and necrotic debris within the cavity. In some cases, the pus may appear tinged with small amounts of blood, especially when inflammation causes fragile surrounding tissues to bleed slightly during drainage. This macroscopic appearance contrasts with amoebic liver abscesses, which classically contain brownish, odorless, “anchovy sauce–like” fluid due to liquefactive necrosis of hepatocytes rather than true purulence. These distinctions are widely recognized in hepatology and infectious disease literature and are particularly helpful in settings where microbiological or serologic confirmation is unavailable.<sup>7, 8</sup> Recognizing these

distinguishing features is essential for guiding appropriate management, especially when laboratory testing and serologic assays are not accessible.

In Indonesia, there remains a scarcity of large-scale studies focusing on pediatric liver abscess, with most available literature limited to single case reports or small case series. However, data from other ASEAN countries provide additional insights that may help contextualize our findings. A ten-year review from the Philippines, for example, analyzed pediatric hepatic abscess cases and emphasized the predominance of right lobe involvement and generally favorable outcomes with timely intervention.<sup>9, 10</sup> Similarly, reports from Malaysia have described both typical and atypical presentations, including cases associated with melioidosis, underscoring the role of imaging in early detection and the challenges of diagnosis in endemic areas.<sup>11</sup> These regional studies highlight that while pediatric liver abscess remains relatively uncommon, its presentation and management may vary depending on local epidemiology, healthcare resources, and underlying comorbidities.

A case report from Indonesia described a young patient with a giant amoebic liver abscess associated with poor food hygiene and unsafe water consumption, further supporting the role of amoebic etiology in endemic regions such as Eastern Indonesia.<sup>10</sup> This case underlines that, although pyogenic liver abscess accounts for the majority of pediatric cases globally, amoebic liver abscess should still be considered an important differential diagnosis in tropical and resource-limited areas. Environmental and socioeconomic factors such as poor sanitation, lack of access to clean water, and dietary practices involving undercooked food contribute to this risk. Clinicians working in endemic regions must therefore maintain a high index of suspicion for both pyogenic and amoebic etiologies when evaluating pediatric patients with hepatomegaly or liver lesions.<sup>1, 12, 13</sup>

The most prevalent symptoms of fever and abdominal pain were similar to most previous reports. Prolonged fever commonly developed, as the median febrile duration before diagnosis exceeded 7 days. The location of pain was diverse, although the right upper quadrant was the most common. Pleural effusion, respiratory tract symptoms, and shortness of breath developed in a considerable percentage of patients, which could possibly be explained by subdiaphragmatic irritation or pleuropulmonary spread of the liver abscess.<sup>11</sup>

A pediatric case report described an amoebic liver abscess initially misdiagnosed as a hepatic tumor because of its clinical and radiological presentation. The child presented with hepatomegaly and abdominal pain, while imaging demonstrated a large hepatic lesion with features that closely resembled neoplasia. Only after further evaluation and clinical correlation was the diagnosis of liver abscess confirmed. This highlights the diagnostic dilemma in pediatric hepatomegaly, as hepatic abscesses may mimic cystic

lesions or malignant tumors both clinically and radiologically. Such cases emphasize the importance of integrating clinical features, imaging findings, and therapeutic response to avoid misdiagnosis and ensure appropriate management in resource-limited settings.<sup>14</sup>

In our case, the patient presented with hepatomegaly, which raised initial suspicion of a cystic lesion or hepatoma. Hepatic cysts are often considered when a well-defined hypoechoic lesion is suspected, while hepatoma or hepatoblastoma may be suspected in pediatric patients presenting with hepatomegaly, abdominal mass, or constitutional symptoms such as weight loss and anorexia. However, ultrasonography revealed features consistent with a hepatic abscess, shifting the diagnosis away from cystic or neoplastic pathology.

Imaging systems, including ultrasonography and computed tomography scanning are valuable implements to validate an area occupying lesion and corroborate the occurrence or non-existence of a liver abscess. Computed tomography has a superior sensitivity compared to ultrasound for the detection of liver abscess; however, this possibility cannot permanently be available in low-middle income countries.<sup>6, 15</sup> The diagnosis of liver abscess in children relies heavily on clinical suspicion supported by imaging studies. Ultrasonography (USG) remains the mainstay of initial evaluation due to its availability, safety, and high sensitivity for detecting hepatic lesions.<sup>6</sup> However, in resource-limited settings such as Alor, several challenges arise. Limited access to advanced imaging modalities like CT or MRI may hinder accurate characterization of lesions, particularly when differentiating pyogenic abscesses from other hepatic pathologies such as tumors or cysts.<sup>6, 13</sup> Furthermore, microbiological confirmation through blood or pus cultures is often not feasible due to laboratory constraints, leading to reliance on empirical antibiotic therapy. Delays in diagnosis may occur because early clinical features—such as fever, abdominal pain, and hepatomegaly—are nonspecific and may overlap with other common tropical diseases like malaria, typhoid fever, or dengue.<sup>4</sup> These diagnostic limitations underscore the importance of maintaining a high index of suspicion, optimizing the use of available resources, and strengthening referral systems for timely intervention.

In addition to imaging, laboratory investigations play a complementary role in diagnosis. Laboratory findings in liver abscess are often nonspecific but can support clinical and imaging assessment. Leukocytosis with neutrophil predominance, elevated inflammatory markers such as C-reactive protein (CRP), and mild alterations in liver function tests are commonly observed. However, normal transaminase or bilirubin levels do not exclude hepatic abscess, especially in early or localized infections.<sup>1, 4</sup> In resource-limited settings, where culture facilities are often unavailable, these laboratory clues—combined with ultrasonographic findings—remain crucial for early diagnosis and management.

Multiple studies have shown a clear shift in the management of liver abscesses toward nonsurgical, minimally invasive approaches. Ultrasound-guided percutaneous interventions, including percutaneous needle aspiration (PNA) and percutaneous catheter drainage (PCD), have largely replaced open surgical drainage as the preferred treatment due to their high success rates and lower morbidity.<sup>16</sup> PNA has demonstrated high effectiveness, with reported success rates of 60–100% and minimal complications, while PCD offers comparable efficacy (up to 92%) but usually requires a longer drainage period and carries catheter-related risks. Although PCD is often recommended for very large abscesses (>10 cm), increasing evidence supports PNA as a safe, simple, and effective first-line option for abscesses >5 cm, and even larger lesions when performed under ultrasound guidance.<sup>17</sup>

In well-resourced settings, ultrasound-guided percutaneous drainage—either through needle aspiration or catheter placement—is considered the preferred initial treatment for liver abscesses because it is minimally invasive, safe, and associated with high success rates and shorter hospital stays.<sup>17</sup> However, in resource-limited environments, where interventional radiology expertise or equipment may not be available, surgical drainage remains an important alternative for definitive management. This demonstrates that treatment decisions may depend as much on resource availability as on clinical factors. In our case, although the abscess size (7 × 6 cm) would typically be amenable to ultrasound-guided aspiration, the absence of percutaneous drainage facilities necessitated exploratory laparotomy, illustrating the practical challenges faced in low-resource settings despite strong evidence supporting minimally invasive approaches.

Aside from procedural considerations, appropriate antimicrobial therapy remains a key component of liver abscess management. In the management of liver abscesses, prompt initiation of empiric antibiotics is essential to prevent sepsis, and treatment should ideally begin after obtaining blood cultures. Small abscesses (<3–4 cm) may respond to medical therapy alone, but larger lesions generally require both antimicrobial therapy and drainage. Empiric regimens should provide broad coverage for gram-negative bacilli, gram-positive cocci, anaerobes, and *Entamoeba histolytica*, making combinations such as ceftriaxone plus metronidazole appropriate choices.<sup>18</sup> For this patient, intravenous ceftriaxone and metronidazole were selected to cover both pyogenic and amoebic etiologies, which is consistent with recommended empiric management in settings lacking microbiological diagnostic capacity. In the absence of culture and serologic testing, the macroscopic appearance of the aspirated fluid and the patient's clinical improvement served as key indicators in determining the likely etiology. Such reliance on clinical response and intraoperative findings reflects the realities of resource-limited environments, where differentiating between pyogenic and amoebic liver abscess often depends on empirical assessment rather than laboratory confirmation.

This case underscores the importance of integrating clinical, laboratory, and imaging findings when evaluating pediatric hepatomegaly in endemic and resource-limited regions. Enhancing awareness among primary care providers and improving access to basic imaging and laboratory diagnostics can facilitate earlier recognition, timely intervention, and better outcomes for children with hepatic abscess.

Studies have shown that early antibiotic therapy combined with drainage, whether percutaneous or surgical, leads to excellent prognosis in most pediatric cases, even in limited-resource hospitals when managed promptly.<sup>1,4</sup>

## Conclusion

This case highlights the challenges of diagnosing and managing pediatric hepatic abscess in resource-limited settings, where advanced imaging and microbiological testing may not be available. Reliance on clinical assessment, basic laboratory findings, and ultrasonography remains essential for early detection. Timely empiric antibiotic therapy and appropriate drainage—whether percutaneous or surgical—can still provide excellent outcomes when minimally invasive options are not accessible. Strengthening early recognition, improving access to essential imaging, and enhancing referral pathways are key to optimizing the management of hepatic abscess in remote regions such as Eastern Indonesia.

## Acknowledgement

The author would like to express sincere gratitude to dr. Bethseba Pulinggomang, Sp.A, Pediatrician at RSD Kalabahi, Alor, East Nusa Tenggara, Indonesia, for her valuable guidance, supervision, and support in the management of this patient and the preparation of this case report. The author also thanks the medical and surgical teams of RSD Kalabahi for their collaboration in providing patient care. We are also grateful to the patient and his family for their kind cooperation and consent to share this case for educational and scientific purposes. Written informed consent was obtained from the patient's parents for publication of this case report. A copy of the written consent is available for review by the editorial board of this journal.

## Conflict of Interest

The authors declare no conflict of interest.

## Funding Statement

This case report received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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