Noma in Laos: Stigma of Severe Poverty in Rural Asia

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Abstract. Noma, or cancrum oris, is a debilitating necrotizing ulcerative stomatitis that destroys the mouth and face. It usually starts in early childhood and is associated with severe poverty, malnutrition, and infections. It is most frequently described from sub-Saharan Africa but is under-reported. There have been very few reports from Asia. We describe the clinical and social features of a series of 12 patients with noma from remote poor villages in rural Lao People’s Democratic Republic (Laos). Noma is an ominous stigma of severe poverty and the description of this disease emphasizes the importance of poverty reduction and nutritional improvement in Lao development. In the meantime, more awareness of the problem and the importance of early therapy in acute noma by primary health care workers may reduce mortality and prevent progression to severe disfigurement.

INTRODUCTION

Oralfacial noma, also known as cancrum oris, is a debilitating necrotizing ulcerative stomatitis that destroys the hard and soft tissues of the mouth and face. Acute noma occurs predominantly in malnourished children 1–4 years of age living in the remotest and poorest parts of the world.1–4 It has been called the “Face of Poverty”5,6 because the disease only occurs in circumstances of extreme poverty, and the survivors are often severely disfigured and functionally impaired. Underlying risk factors are thought to include poverty, malnutrition (especially stunting), infections (especially measles), impaired cell-mediated immunity, living in close contact with domestic mammals, vitamin deficiencies, poor sanitation, poor oral health, and poor access to health care.3,7–9 Because these problems are usually associated in rural communities, it has been difficult to tease out which aspects of underprivilege are key factors predisposing to noma. The pathophysiology and microbiology remain unclear, but Fusobacterium necrophorum may be important in Nigerian children with noma.3,9

Children with acute noma present with bad breath, fever, malnutrition, and gingival ulceration. If recognized early, the patient can be treated successfully with antibiotics, oral hygiene, and nutritional measures.3,10 Untreated, the ulcer rapidly progresses to involve the lip and cheek. Within days, a lesion develops with a black necrotic center and well-demarcated border. Soft tissue, bone, and teeth are lost, leaving a hole in the face. Most of the children suffer terribly and die, without diagnosis or reporting. The survivors are left severely disfigured, functionally impaired, and unable to move their jaws to chew and speak. Their appearance and difficulties with speech and eating result in isolation and psychologic scarring. Reconstructive surgery is difficult, expensive, and rarely available to noma survivors.3

Noma was common in Europe and the United States until the early 20th century, from where it has all but disappeared, except for victims of concentration camps such as Bergen-Belsen and in association with HIV, severe combined immunodeficiency syndrome, and immunosuppressive therapy.3 There are few data, but in 1998, WHO estimated that 140,000 children/yr develop noma, with a mortality of 79%.5,6,11 Reports are overwhelming from sub-Saharan Africa, but the incidence and prevalence of noma is grossly underestimated because poor communities do not keep records and the victims die or are hidden.5 It has been estimated that <10% of noma patients seek medical care during the acute stage.3 The “paradox of noma” is that when countries develop sufficient public health resources to recognize and report noma cases, the economic and health development usually allows the disease to disappear.5,6

In contrast to Africa, noma has rarely been reported from Asia. In a recent review,3 noma was described as reported from China, Vietnam,12–14 and Afghanistan15 before 1980 and in India,16–19 Pakistan, and Burma in 1994–2000 with “sporadic recent cases” in Papua New Guinea20 and Japan. In Vietnam, it has been expressively known as “oral inflammation like the galloping horse.”6 We are not aware of any reports in the scientific literature of noma in Cambodia, Burma, Thailand, or Lao People’s Democratic Republic (Laos). However, a description of a probable survivor of noma from Muang Sing, Luang Nam Tha, Northwest Laos, was described 50 years ago in a doctor’s autobiography.21

MATERIALS AND METHODS

After meeting the first patient with noma, an ad hoc pilot study was conducted to determine whether further noma patients were present in Laos. Since 2002, we have looked ad hoc for patients with noma during conversations with colleagues and visiting hospitals and villages without a formal study design. All patients gave written informed consent for the description of their clinical details and photographs, and the Declaration of Helsinki has been followed.

RESULTS

Laos is a land-locked country of ∼5.7 million people with 75% of the population as rural rice farmers and a wide diver-
sity of ethnic groups. Infant mortality is high (8.2%) and life expectancy is low (55 years), with a low per capita gross domestic product (GDP) of 375 USD/yr.\textsuperscript{22,23}

Since 2002, we have identified a series of 12 patients with noma from 6 of the 17 Lao provinces (Supplementary Table; Figure 1). The first patient was diagnosed by LS in 2002 on a visit by small boat down the Namtha River to a small, extremely poor Khamu ethnic minority village on the river bank, surrounded by steep mountains, without paddy lands, and no source of clean water or electricity. Signs of poor nutrition and vitamin deficiencies were obvious at a glance, including children's swollen bellies, cloudy corneas, angular stomatitis, and stunting, and adults with goiters. The patient was sitting in a corner with her face to the wall with a hole in the side of her face, unable to move her jaw. She had to push food inside the hole in her face and press it with her finger against her teeth. Saliva escaped from the hole. Her speech was limited to a whisper. She avoided social interaction, covered her face, and ate alone. Supported by international volunteers and donations, she has since had three operations, the hole in her face has been closed, and she is able to move her jaw to eat and speak in public and socialize more freely.

After meeting this patient, inquiries were made with patients and colleagues while traveling within Laos to identify whether more patients with noma were present in the country. Another 11 patients were identified and are described in the Supplementary Table, with their geographical distribution shown in Figure 1. Patients with noma were not actively searched for, and it is likely that many more would be discovered if looked for in remote areas. The median age at description was 22 years of age (range, 7–30 years), and the age at onset was 3 years in 3/12 (25%), 4 years in 1/12 (8%), 5 years in 1/12 (8%), 6 years in 4/12 (33%), 7 years in 2/12 (17%), and 8 years in 1/12 (8%). The median year of onset was 1989 (range, 1981–2003). All survivors lacked resources to seek appropriate medical care. A Lao development worker from Nalae District gave an expressive Lao name for noma, “Pagnad Pak Poue,” or “disease of mouth rotting.”

In addition to these 12 patients, the Australian Interplast team encountered 8 noma survivors (median age, 21.5 years; age range, 15–39 years) from Oudomxay (6), Borikhamxay (1), and Champassack (1) provinces in 2003. In 2004, they encountered 14 noma survivors: Vientiane (7) province, Champassak (5), and 2 from unknown provinces. In 2007, the team met an 18-year-old female noma survivor in Sam Neua, Huaphanh Province.

**DISCUSSION**

Few doctors in Asia are aware of noma and would not recognize the disease because it has rarely been described from that continent. However, it is likely that it is much more frequent in remote Asian rural communities than is currently appreciated. The true burden of diseases will be difficult to determine because of the high mortality of acute noma, lack of reporting systems, inaccessibility of much of the population who live in gross poverty, the understandable tendency for patients to hide, and the “paradox of noma.”

Noma is a clinical diagnosis. Diseases that could be confused with this disease, such as leishmaniasis, are not known to occur in Laos. Congenital deformity, malignancy, HIV infection, and syphilis seem unlikely to have been the cause of these patients’ disfigurement. There are at least five potential risk factors for noma in Africa that are also likely to be applicable in Laos. Poverty is a key associate, with low indices of income and health in Laos.\textsuperscript{22} Noma is associated with stunting,\textsuperscript{23} and malnutrition and poor food security are severe problems in Laos.\textsuperscript{24} In 2001, it was estimated that 41% of Lao children were stunted,\textsuperscript{25} and in Luangnamtha (where 6/12 of the noma patients came from) and Sekong, 74% and 63%, respectively, of children 3–15 years of age were stunted.\textsuperscript{26} Measles and malaria remain important in Laos,\textsuperscript{27–29} and there is evidence that these infections may be associated with noma.\textsuperscript{3} A recent weekly epidemiologic surveillance report described 77 cases of clinical measles from Luangnamtha province, including 48 from Nalae District and 29 from Muang Sing District.\textsuperscript{30} The estimated prevalence of HIV infection in Laos has been lower than in adjoining countries, with a 1.1% prevalence of HIV antibodies among “women working in bars, night clubs, and guesthouses” in Vientiane in 2001.\textsuperscript{31} We do not know whether HIV played a role in these patients with noma, but because they were from isolated rural communities, this seems unlikely. As in much of Africa, rural Lao people live in close association with domestic mammals, and it has been suggested that this is a risk factor for noma and the acquisition of *F. necrophorum*. It has also been noticed in Africa that noma is rare in communities that breast-feed exclusively in the first 3 months of life.\textsuperscript{3,32} Although 95% of infants in Laos are breastfed (Ministry of Health 2001), many (53% in Vientiane)\textsuperscript{33} are also given other foods in the first few months of life, principally maternally masticated glu-
tuous rice, and at least in Vientiane city, such complementary food provision was associated with stunting. The median year of noma onset was 1989, with only one patient born after 1987. This could mean that the incidence of noma has declined with increased development, but this may not be the case, because children with the sequelae of noma are often hidden, and our non-systematic identification of patients is unlikely to be representative of the actual age distribution. More detailed research is needed on the incidence of this disease in rural Asia.

Because acute noma progresses rapidly and the impairments produced are difficult to correct surgically, prevention, through appropriate measures to reduce poverty and malnutrition, is vital. The identification of noma is an ominous stigma of severe poverty, and the description of this disease should emphasize the importance of poverty reduction and improvement in nutrition in Lao development. In the meantime, greater awareness of noma and the importance of early therapy in acute disease by primary health care workers may reduce mortality and prevent progression to severe disfigurement and dysfunctionality. The districts where noma has been found could be targeted, and primary health care workers should be educated on the identification and therapy of acute noma. In the longer term, the socioeconomic development of the country will be vital in reducing the underlying risk factors for noma and lead to the elimination of this preventable childhood disease.

Note: The supplementary table, “Social and clinical details of ten patients with a clinical diagnosis of noma from Laos,” appears online at www.ajtmh.org.

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REFERENCES


Supplementary Table.

Social and clinical details of ten patients with a clinical diagnosis of noma from Laos. All patients gave informed written consent for their photographs to be used. Province names follow Sisouphanthong & Taillard [34].

<table>
<thead>
<tr>
<th>No</th>
<th>Province</th>
<th>District</th>
<th>Classification</th>
<th>Information</th>
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<tbody>
<tr>
<td>1</td>
<td>Luangnamtha</td>
<td>Nalae</td>
<td>N1, O3, I3, T4, U3, L1, P0</td>
<td>21 year old Khamu (Lao Thung) woman. Onset of noma at age 4. The disease began in her teeth, a sore developed with bad smell and drainage. She was treated with traditional medicines. Her jaw bone broke and teeth came out. She was treated at the district hospital with antibiotics and debridement of dead tissue. She developed trismus. After three weeks, she began to heal. She lost part of her cheek, nose, lip and one eye became lower. Her parents fed her breast milk in a cup. One of nine children, four of whom died in the first year of life. There were 1 or 2 other children in her village with noma, who died. Their village is extremely poor, without electricity, running water or market. The area is extremely mountainous, without paddy fields. The village used to be located on the top of the mountain, where noma also occurred, but has moved to the river side. She has had three operations to correct the ankylosis and close the hole in her face.</td>
<td>Copyright 2003 Ariyan Watt</td>
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<td>2</td>
<td>Luangnamtha</td>
<td>Nalae</td>
<td>N0, O2, I2, T2, U2, L2, P0</td>
<td>In early 2003 active noma in a 7 year old Khamu (Lao Thung) boy was seen and photographed by BW. His parents carried him 12 h from a remote mountainous village to reach the district hospital. The child was treated with antibiotics and nutritional support. The parents took the child home and hospital doctors believed that the child died, but the child was found in 2007. The child’s picture with active noma in 2003 (above) and a follow up picture in 2007 (below) are included. He had surgery by Dr. Keutmy and the Bridge the Gap Foundation in 2008.</td>
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<td>3</td>
<td>Luangnamtha</td>
<td>Nalae</td>
<td>N0, O2, I3, T4, U0, L0, P0</td>
<td>A 27 year old Thailu man with onset of noma at six years of age. He was treated at the Nalae District Hospital for three days. He had trismus with a missing right mandible. He had a 3 cm scar in his right cheek. This patient is from the same village as Patient 4. He had surgery by Dr. Keutmy and the Bridge the Gap Foundation in 2008.</td>
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<tr>
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<td>4</td>
<td>Luangnamtha</td>
<td>Nalae</td>
<td>N1, O3, I3, T1, U2, L2, P0</td>
<td>A 22 year old Thailu man with onset of noma at three years of age. He is from the same village as the man above and had noma in the same year. He had no medical care. He was missing 25% of his upper lip, can move his jaw and had three upper teeth exposed. He had surgery by Dr. Keutmy and the Bridge the Gap Foundation in 2008.</td>
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<td>5</td>
<td>Luangnamtha</td>
<td>Muang Sing</td>
<td>N0, O3, I3, T4, U0, L0, P0</td>
<td>A 30 year old Yao (Lao Theung) woman. Onset of noma at 6 years of age. The disease began in the teeth and ate through her skin and face. She had no medical treatment during the acute phase. She is the third of nine children, four of whom died under five with fevers. Her mother died while giving birth. The village is extremely poor with poor hygiene and distant access to water, no clean water, electricity, a distant market, and her children have not been immunized. She had a surgery at the Provincial Hospital in 2004 to close the opening in her face. She can eat only fluids, due to limited opening of her mouth and trismus.</td>
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<td>6</td>
<td>Khammouane</td>
<td>Mahaxay</td>
<td>N1, O3, I3, T4, U3, L1, P0</td>
<td>A 22 year old Lao Loum man with onset of noma when he was 3 years old. The illness began with fever and infection in his mouth and spread to his teeth and bone, with the acute period lasting about one month. He was treated at the Provincial Hospital for one month. He is one of 7 children and one of twins, the other twin died at birth. His village was extremely poor; without clean water, electricity, immunizations, adequate food or market or access to health care. Patient #7 lives nearby. The patient has trismus, with 1–2 cm jaw opening.</td>
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<td>No</td>
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<td>7</td>
<td>Khammouane</td>
<td>Mahaxay</td>
<td>N0, O3, I3, T2, U3, L3, P bilateral noma</td>
<td>A 28 year old Lao Loum farmer whose disease began when aged 7-8 years old with a tooth problem, progressing to severe illness for several days, leading to delirium. He was treated with traditional medicine and fed soft foods. One of six children, three died in childhood. The village was very poor, but is improving with better road access. He has trismus, with 2-3 cm jaw movement. He stopped attending school after the onset of the disease because he was “too shy.” He can open his mouth 2-3 cm.</td>
<td><img src="image1.jpg" alt="Image" /></td>
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<td>8</td>
<td>Borikhamxay</td>
<td>Viengthong</td>
<td>N0, O2, I3, T1, U1, L0, P0</td>
<td>A 28 year old Lao Loum woman with onset of noma when she was 3 years old. She received only traditional treatment. The village is extremely poor in a remote mountainous region with poor roads, no access to health care, inadequate food and no market. She had surgery at Mittaphab Hospital (Hospital 150) Vientiane, in 2007 supported by L.E.A.P.</td>
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<td>9</td>
<td>Vientiane</td>
<td>Xaysomboun</td>
<td>N0, O2, I2, T2, U0, L0, P0</td>
<td>A 23 year old Hmong (Lao Sung) man with onset of noma when he was 6 years old, beginning with swelling of the cheek. He was treated at the provincial hospital, including debridement of dead skin. He had surgery at Mittaphab Hospital (Hospital 150), Vientiane, in 2007 supported by L.E.A.P.</td>
<td><img src="image3.jpg" alt="Image" /></td>
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<td>10</td>
<td>Luangnamtha</td>
<td>Nalae</td>
<td>N0, O2, I2, T1, U2, L1, bilateral noma</td>
<td>A 20 year old Lao Loum woman with onset of noma when she was 5 years old. The disease began with three days of fever, then swelling of the face. She was treated medically at the district hospital. The village used to be poorer, but they still have to carry water more than 500 meters. There was another child with noma in the same year as her disease onset who died. She had surgery at the provincial hospital and at Mittaphab Hospital (Hospital 150), Vientiane, in 2007 supported by L.E.A.P.</td>
<td><img src="image4.jpg" alt="Image" /></td>
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</table>
11 Luang Prabang Khe Nam Thuam
N0, O2, I2, T4, U3, L2, P0
A 20 year old Hmong woman with onset of noma when she was 8 years old. Her symptoms began with a headache, with rotting of skin overnight. She received no medical treatment and her mouth healed painfully over one month. She is married and has three young children. Their village does not have clean water, two children have had no immunizations and it is two hours walk to a health clinic. Two other women in her village survived noma with scarring. One committed suicide. This patient has great difficulty eating, an activity which takes a lot of time. She cannot use a spoon and is unable to clean her mouth.

12 Huaphan Samti
N1, O3, I3, T4, U3, L2, P0
A 22 year old Lao Lum man with onset of noma at age 6. His symptoms began with fever. He was treated at the district hospital with debridement and hospitalized for one month. He is one of 9 children, 3 of whom died in childhood. Their village is developing and now has clean water and improved access to health care. He had surgery at Mittaphab Hospital (Hospital 150), Vientiane, in 2007 supported by L.E.A.P.

\*Noma classification (from Marck 2003)
N = nose
O = outer cheek
I = inner cheek
T = trismus
U = upper lip
L = lower lip
P = particularities, such as loss of eye
Extent of tissue loss
0 = no loss
1 = up to a quarter of anatomic unit
2 = 1/4-1/2 anatomic unit
3 = 1/2-3/4 anatomic unit
4 = more than 3/4 to complete loss
Trismus (extent to which the mouth can be opened)
0 = normal
1 = < 4 cm
2 = < 3 cm
3 = < 2 cm
4 = < 1 cm or ankylosis

Lao people are conventionally divided into three main ethnic groups: Lao Loum (lowlanders), Lao Thung (people of middle elevation) and Lao Sung (highlanders)