Noma—The Face of Poverty

- **Noma**: in Greek, “to devour”
- **Cancrum Oris**: in Latin, “gangrene of the mouth”
- **Ciwon Iska**: in Hausa, “the wind disease”
Noma

- Destroys the soft tissues and bones of the face
- Starts as an ulcer in the mouth
- Rapidly spreads through orofacial tissues
- Has a mortality rate of 70-90%
- Claims 140,000 children per year

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Complex Interaction between:

- **Malnutrition**
- **Intraoral infections**
- **Compromised Immunity**

*Figure 1.4 Schematic representation of the factors responsible for the development of noma.*

*The Surgical Treatment of Noma (2006)*
KEY MESSAGE

Noma is NOT Contagious

Healthy Children do NOT develop noma

Courtesy of Melissa Phillips
KEY MESSAGE

4 Major Risk Factors

Malnutrition

Lack of Access to Medical Care

Extreme Poverty

Poor Hygiene and Sanitation

Recent Immuno-suppressive Infection

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Both Severe and Moderately malnourished children are at risk

Lack of essential micronutrients

Nutritionally Acquired Immune Deficiency Syndrome (Nutritional AIDS)  Growth Stunting

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Risk Factor #2
Poor Hygiene and Sanitation

- Contamination of food & water with human and animal waste
- Poor personal cleanliness
  - Lack of brushing teeth, bathing regularly, and washing hands and face
- Custom of bringing livestock into family living quarters
Common immuno-suppressive infections that are precursors of noma include:

- Measles
- Malaria
- Tuberculosis
- HIV
Risk Factor #4 Lack of Access to Medical Care

- **Barriers**
  - Distance to community health clinic
  - Rapid progression of noma allows for limited intervention time
Our GOAL is to prevent this tragedy!

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
KEY MESSAGE

Learn to recognize the **Noma Context:**

- Impoverished family
- Poor sanitation
- Chronically malnourished child
- Compromised immunity
- Recent severe infection such as measles or malaria
Recognizing Clinical Stages of Noma in a Child at Risk

Stage 1
- Mucosal Lesion

Stage 2
- Facial Swelling

Stage 3
- Gangrenous Plaque

Stage 4
- Scar Tissue

MATTER OF WEEKS

All Pictures Courtesy of: C.O.Enwonwu
Archs of Oral Biol, 1972

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Stage 1: Mucosal Lesion

- Acute Necrotizing Ulcerative Gingivitis
- Associated with:
  - Swollen, sore gums
  - Gums bleed when eating or when teeth are cleaned
  - Bad breath, drooling, spits a lot
  - Does not want to eat
  - Loses weight quickly

Examples of Acute Necrotizing Ulcerative Gingivitis
Stage 2: Facial Swelling

If the immune system is sufficiently weakened the soft tissue against the gingival lesions start swelling.

C O Enwonwu, Archs of Oral Biol, 1972
Examples of Facial Swelling

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In a few days, in the absence of any intervention, there is formation of a gangrenous plaque which indicates the area of future loss of tissue.
Examples of Gangrenous Plaque

All Images Courtesy of:

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Stage 4: Scar Tissue

If noma victim survives, child is left with:

- Large scar tissue
- Facial disfigurement
- Speech impairment
- Feeding problems
- Social rejection

Examples of Scar Tissue


BBC Noma Gallery

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
If the infection is treated early it will not progress to deep tissue loss.
Treatment Protocol

- Oral Hygiene: Disinfect mouth and gingiva with warm salt water
- Start oral amoxicillin or metronidazole IMMEDIATELY (See charts for doses)
- All STAGE 2 cases should begin appropriate treatments without delay while arranging URGENT MEDICAL REFERRAL
- Provide nutritional rehabilitation including supplying essential micronutrients and Vitamin A
# Amoxicillin 250 mg - Moderate Dose

**Early Intervention Regimen for Moderate Infections**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Weight Range</th>
<th>Number of Tablets for 14 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newborn</strong></td>
<td>0-1 week or &lt;2 kg</td>
<td>11 tablets</td>
</tr>
<tr>
<td><strong>Young Infant</strong></td>
<td>1 week - 2 months or</td>
<td>2-5 kg (4.5-10lbs)</td>
</tr>
<tr>
<td></td>
<td>2-5 kg (4.5-10lbs)</td>
<td></td>
</tr>
<tr>
<td><strong>Older Infant</strong></td>
<td>2-12mos or 5.9 kg (10-20lbs)</td>
<td>32 tablets</td>
</tr>
<tr>
<td><strong>Toddler/Pre-school</strong></td>
<td>1-4 years or 10-19 kg (20-40lbs)</td>
<td>42 tablets</td>
</tr>
<tr>
<td><strong>School Age</strong></td>
<td>5-11yrs or 20-40 kg (40-90lbs)</td>
<td>63 tablets</td>
</tr>
<tr>
<td><strong>Pre-teen/Adult</strong></td>
<td>12 yrs to adult</td>
<td>82 tablets</td>
</tr>
</tbody>
</table>

### Notes:
- Duration of therapy - 14 days for noma, 3 days for non-severe pneumonia, 5 days for acute ear infections, 10 days for tonsillitis.
- If care is delayed, and the child presents a swollen cheek use the double dose: Save patient's life and limit permanent damage to the face.
- Maintain AMOXICILLIN 250 mg Emergency Stock in Child Survival Kit in each village to avoid treatment delays.
- Treat gingivostomatitis following measles or malaria in a malnourished child to prevent progress to noma. Also include essential micronutrient supplements, Vitamin A triple dose, Dentifrice, and improved nutrition (i.e. eggs and oil).
- Metronidazole with Amoxicillin recommended if both are available. Amoxicillin/clavulanate is another excellent option with or without metronidazole.
- Seek consultation as soon as possible. Continue treatments while traveling to the clinic or hospital. When child comes to attention, dispense full number of doses so that treatment can continue in event of further delay.
- If Amoxicillin is in capsule: Open and divide powdered contents. Tablets may be crushed and mixed with breast milk, food, liquid or sugar and fed to children with spoon.
- Taking with food is not necessary but can help if stomach is upset.
- Amoxicillin used for tonsillitis, ear infections, sinusitis, lung infections (pneumonia), eye infection after measles, soft tissue, skin, umbilical (navel) and urinary infections. Use double dose for critical illness and delayed treatment. (See page 8 in IMCI booklet.)
- Critically ill malnourished child may not express signs of infections. Therefore, it may be life-saving to begin a course of broad spectrum oral antibiotics such as cotrimoxazole and/or metronidazole and amoxicillin while referring to a higher level of care.
- Category B: Safe in Pregnancy

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Amoxicillin 250 mg - High Dose
Emergency Early Intervention Regimen for Noma, Severe Pneumonia, and other Serious Infections

Newborn
0-1 week or <2 kg
22 tablets for 14 days

Morning | Noon | Afternoon | Evening
--- | --- | --- | ---
I | I | I | I

Young Infant
1 week-2 months or 2-5 kg (4.5-10lbs)
42 tablets for 14 days

Morning | Noon | Afternoon | Evening
--- | --- | --- | ---
1 | 1 | 1 | 1

Older Infant
2-12mos or 5-9 kg (10-20lbs)
64 tablets for 14 days

Morning | Noon | Afternoon | Evening
--- | --- | --- | ---
1 | 1 | 1 | 1

Toddler/Pre-school
1-4 years or 10-19 kg (20-40lbs)
84 tablets for 14 days

Morning | Noon | Afternoon | Evening
--- | --- | --- | ---
I | I | I | I

School Age
5-1 yrs or 20-40 kg (40-90lbs)
126 tablets for 14 days

Morning | Noon | Afternoon | Evening
--- | --- | --- | ---
1 | 1 | 1 | 1

Pre-teen/Adult
12 yrs to adult
164 tablets for 14 days

Morning | Noon | Afternoon | Evening
--- | --- | --- | ---
1 | 1 | 1 | 1

Notes:
- At first sign of early noma, begin AMOXICILLIN 250mg/tablet. Continue 14 days.
- If care is delayed, and the child presents a swollen cheek use the double dose: Save patient’s life and limit permanent damage to the face.
- Maintain AMOXICILLIN 250 mg Emergency Stock in Child Survival Kit in each village to avoid treatment delays.
- Treat neutrotizing gingiva-stomatitis following measles or malaria in a malnourished child to prevent progress to noma. Also include essential micronutrients supplements, Vitamin A triple dose, Dentine, and improved nutrition (ie. eggs and oil).
- Metronidazole with Amoxicillin recommended if both are available. Amoxicillin/clavulanate is another excellent option with or without metronidazole.
- Seek consultation as soon as possible. Continue treatments while traveling to the clinic or hospital. When child comes to attention, dispense full number of doses so that treatment can continue in event of further delay.
- If Amoxicillin is in capsule: Open and divide powdered contents. Tablets may be crushed and mixed with breast milk, food, liquid or sugar and fed to children with spoon.
- Taking with food is not necessary but can help if stomach is upset.
- Amoxicillin used for tonsillitis, ear infections, sinusitis, lung infections (pneumonia), eye infection after measles, skin, soft tissue, umbilical (navel) and urinary infections. Use double dose for critical illness and delayed treatment.
- Critically ill malnourished child may not express signs of infections. Therefore, it may be life-saving to begin a course of broad spectrum oral antibiotics such as cotrimoxazole and/or metronidazole and amoxicillin while referring to a higher level of care.
- Category B: Safe in Pregnancy

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# Metronidazole 250 mg

Emergency Early Intervention for Noma and Suspected Pre-Noma Lesions, and other Infections

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Dosage</th>
<th>Tablets for 14 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newborn</strong></td>
<td>0-1 week or &lt;2 kg</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Morning 15 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noon 15 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td></td>
</tr>
<tr>
<td><strong>Young Infant</strong></td>
<td>1 week-2 months or 2-5 kg (4.5-10lbs)</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Morning 15 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noon 15 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td></td>
</tr>
<tr>
<td><strong>Older Infant</strong></td>
<td>2-12 mos or 5-9 kg (10-20 lbs)</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Morning 15 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noon 15 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td></td>
</tr>
<tr>
<td><strong>Toddler/Pre-school</strong></td>
<td>1-4 years or 10-19 kg (20-40 lbs)</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Morning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noon 15 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td></td>
</tr>
<tr>
<td><strong>School Age</strong></td>
<td>5-11 yrs or 20-40 kg (40-90 lbs)</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Morning</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Noon 15 mg/kg</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td>1</td>
</tr>
<tr>
<td><strong>Pre-teen/Adult</strong></td>
<td>12 yrs to adult</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>Morning</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Noon 11</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Afternoon 11</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Evening 11</td>
<td>11</td>
</tr>
</tbody>
</table>

**Notes:**
- At first sign of early noma, begin METRONIDAZOLE 250mg/tablet. Continue 14 days.
- Maintain METRONIDAZOLE 250 mg Emergency Stock in Child Survival Kit in each village to avoid treatment delays.
- Treat netherotics gingiva-stomatitis following measles or malaria in a malnourished child to prevent progress to noma. Also include essential micronutrient supplements, Vitamin A triple dose, Dentifrice, and improved nutrition (i.e. eggs and oil).
- Metronidazole with Amoxicillin recommended if both are available. Amoxicillin/clavulanate is another excellent option with or without metronidazole.
- Seek consultation as soon as possible. Continue treatments while traveling to the clinic or hospital. When child comes to attention, dispense full number of doses so that treatment can continue in event of further delay.
- If METRONIDAZOLE is in capsules: Open and divide powdered contents. Tablets may be crushed and mixed with breast milk, food, liquid or sugar and fed to children with spoon.
- Taking with food is not necessary but can help if stomach is upset.
- Also use for eye infection after measles, with Amoxicillin.
- Metronidazole is also used for trichomoniasis, bacterial vaginosis, amebic liver abscess, intestinal amebiasis, pelvic and abdominal infections (with other antibiotics), giardiasis, c.c difficile diarrhea.
- Critically ill malnourished child may not express signs of infections. Therefore, it may be life-saving to give a course of broad spectrum antibiotics such as cotrimoxazole and/or metronidazole and amoxicillin while referring to a higher level of care.
- Category B: Safe in Pregnancy

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Oral Disinfectant Mouth Wash

- Start by gently cleaning the gums and teeth with a damp cloth soaked in clean, warm water
- Rinse mouth with warm salt water or any available oral disinfectant
  - Note: If using hydrogen peroxide, mix 1 part hydrogen peroxide with 5 parts water
- Use 4 cups each day until the bleeding stops
- Rinse and spit. Do not drink the salt water!
- When well, clean mouth and rinse with water or salt water at least daily to keep the gums strong.

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Specific Nutritional Deficiencies Associated with Noma:

- Vitamin A
- Zinc
- Selenium
- Protein
- Other minerals and vitamins, including B’s C, D, and more
Late Intervention Treatment

- Treatment Protocol
  - Provide Early Intervention Treatment
  - **Bring the child to a specialist as soon as possible.** If unable follow these steps:
    1. Gently pull away dead skin with tweezers, being careful not to remove adherent gangrenous plaque.
    2. Wash the inside of the sore with hydrogen peroxide diluted one part hydrogen peroxide to five parts cooled boiled water. (Be sure you measure the hydrogen peroxide carefully. Too strong a solution will cause further tissue damage.) You can also clean the wound with an iodine solution.
    3. Prepare a dressing by:
       - Soaking cotton gauze in salt water.
       - Squeezing out the extra water so that it is damp.
    4. Place dressing in the wound and cover it with a dry bandage.
    5. Every day, remove the bandage, wash the wound with dilute (1:5) hydrogen peroxide, and put in a new dressing. Do this until the wound does not smell anymore and there is not more dark dead skin.
Late Intervention Treatment

- **Treatment Protocol:**
  - **Surgery** to release the scar, and close the wound
  - **Dental care**, including possibly jaw wiring to hold the mouth in a function position during healing
  - **Physical therapy and speech therapy** to restore function
  - **Counseling**, especially if the family believes that noma is a curse

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Treat the illness that provoked the occurrence of Noma

- If child has malaria treat with anti-malarial drugs.
- Look for any other illness, especially measles and tuberculosis, and treat appropriately.
These Oral Diseases can allow a Portal of Entry for Noma:

- Thrush, Yeast, Candida
- Acute necrotizing ulcerative gingivitis
- Chicken Pox
- Herpes on Hard Palate or Lips
- Koplik Spots (Early Sign of Measles)
- Measles

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Treatment is Good

BUT

PREVENTION is BETTER
Prevention #1: Teach Good Nutrition

Eggs, Meat, Fish
- Rich in protein, builds strong tissues, repairs damage from trauma

Fruits and Vegetables
- Rich in Vitamins to strengthen the immune system and gums
- Vitamin Rich Vegetables help prevent cavities and sore gums

Palm Nut, Ground Nuts, Coconut
- Oil from:
- Supplies energy, helps vitamins get absorbed, helps brain development in young kids

Peas and Beans
- Provides proteins to prevent cavities and sore gums

Amaranth Tops, Spinach, Beet & Carrot
- Provides proteins to prevent cavities and sore gums

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Prevention #2:

Administer Vitamin A

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Focus on Vitamin A

- Functions
  - Improves Immunity
  - Vision (night, day, color)
  - Skeletal Growth
  - Fetal Development
  - Fertility

- Vitamin A Prevents Infections and Improves Growth
Vitamin A can also Prevent Nutritional Blindness

Xerophthalmia
Dry Eye

Bitot Spots

Hazy dry cornea poor quality — Keratomalacia

Gelatinous cornea, bulging, about ready to rupture. If that happens, the eye will be permanently blind.

Same eye, healed by timely Vitamin A capsules. Scar remains, but vision is good.

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
## Vitamin A Mega-Dose Capsules

200,000 International Units/Capsule

**Prevention & Treatment Doses**

Repeat this dose as recommended for emergency indications

<table>
<thead>
<tr>
<th>Age:</th>
<th>UNITS /Dose</th>
<th>Capsule</th>
<th>Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants less than 6 months:</td>
<td>50,000</td>
<td>1/4</td>
<td>Breast milk provides Vitamin A</td>
</tr>
<tr>
<td>Non-breast-fed, or breast-fed if mother has not received supplemental vitamin A</td>
<td></td>
<td>(2 drops)</td>
<td></td>
</tr>
<tr>
<td>Infants 6 to 12 months:</td>
<td>100,000</td>
<td>1/2</td>
<td>Give eggs, milk, greens, fruits, colored vegetables</td>
</tr>
<tr>
<td>Every 4-6 months</td>
<td></td>
<td>(4 drops)</td>
<td></td>
</tr>
<tr>
<td>Children over 12 months:</td>
<td>200,000</td>
<td>1</td>
<td>Not safe for girls or women who may become pregnant!</td>
</tr>
<tr>
<td>Every 4-6 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers within 6 weeks after delivery</td>
<td>200,000</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
## Recommendations for Vitamin A Administration (2002 IVACG)

<table>
<thead>
<tr>
<th>Population</th>
<th>Amount of Vitamin A to be administered</th>
<th>Time of Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants 0-5 months</td>
<td>3 doses of 50,000 IU each with at least 1 month interval between doses</td>
<td>At each DTP contact (6, 10, and 14 weeks) otherwise at other opportunities</td>
</tr>
<tr>
<td>Infants 6-11 months</td>
<td>100,000 IU as a single dose every 4-6 months</td>
<td>At any opportunity (e.g., measles immunization)</td>
</tr>
<tr>
<td>Children 12 months and older</td>
<td>200,000 IU as a single dose every 4-6 months</td>
<td>At any opportunity</td>
</tr>
<tr>
<td>Postpartum Women</td>
<td>2 doses of 200,000 IU at least 1 day apart</td>
<td>As soon after delivery as possible and not more than 6 weeks later.</td>
</tr>
</tbody>
</table>
Prevention #3:

Micronutrients

Source: GAIN
Micronutrients

- Government mandated food fortification
  - Flour * Sugar * Salt * Milk * Margarine
- Focused supplements for women and children
- Multivitamins and mineral tablets
- Home food fortification with micronutrient powders
Recognizing Malnutrition

- Acute Marasmus
- Wasting
- Too Thin
- Can be Moderate or Severe

- Kwashiorkor
- Protein Deficient
  - Swollen
  - Always Severe
Chronically Malnourished Children

- May not look as ill as wasted or swollen children
- Growth Stunting
- “Hidden Hunger”
Prevention #4:

Improved diet for pregnant and nursing mothers
Prevention #5:

Breastfeeding

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Breast Milk is PERFECT Food!

- It is clean, convenient, and FREE!
- Helps the womb stop bleeding following birth
- Protects baby from infections or illnesses by passing on the mother’s defenses against disease through her milk

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Breastfeeding Saves Lives

- Start Breastfeeding within the **FIRST HOUR** of birth
- **Exclusive breast feeding** for first 6 months
- **Continue breast feeding** for at least two years
- Wean slowly
  - Start with easily digested foods
  - Every few days add something new:
    - Mashed fruits, vegetables, eggs, meats, and fats

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Prevention #6:

Personal Hygiene

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Proper Brushing Technique

Starting at Infancy

• Clean baby’s gums after each feeding using a clean soft cloth
• Clean baby’s teeth using a small soft bristled toothbrush
• Avoid feeding bottles to prevent tooth decay and gum disease
• Rinse child’s mouth after every meal
Personal Hygiene

• Wash your hands and child’s hands and face before and after each feeding with CLEAN water

• Bathe Regularly
Prevention #7:

Community Wide Infection Control

MAMA Project Inc., Pan American Health Organization, and The University of Maryland Dental School
Infection Control Interventions

**Immunizations** (Especially MEASLES)
- Limits the frequency and spread of common infectious diseases like measles, tuberculosis, and tetanus

**Deworming**
- Control Intestinal Parasites

**Insecticide Treated Bed Nets**
- Prevent Malaria spread by Mosquitoes
Prevention #8:

Sanitation
Clean Water and Food

- Keep community water sources free of contamination
- Water must be boiled and covered to prevent contamination in the home
- Wash and dry dish and spoon before and after use and cover utensils with a clean cloth
- Germs grow quickly in food that is not consumed immediately, so store after no more than 2 hours
Dispose properly of all human waste to stop the spread of diseases.
Keep Livestock out of Home

Do not allow animals in areas where children sit, play or sleep.

Build Fences!
With Prevention and Control of Noma in Communities:

- Many other common diseases that lead to death will be prevented.
- The lives of many women and children will be saved.
- School performance will improve.
- A healthier environment will lead to a higher quality of life.