

Ecology of Childhood Disease in the Karamojong of Uganda

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Uganda, one of the newest of the independent African states, has a population of over 6.5 million people belonging to at least 35 tribes, and in the northeastern part of the country live a group of people—the Karamo-

jong—who are distinct not only as a tribe with their own culture and way of life, but also because of their physical habitat which differs conspicuously from the rest of the country.¹⁻⁶ In addition, this tribe has been least influenced by the process of modernization and acculturation proceeding with such speed in other parts of Uganda.

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Karamoja district (Fig 1) forms a separate ecosystem with man-cattle-grass-sorghum (*Sorghum vulgare*)-water as some of the prominent interdependent components in such a striking way that it was decided to

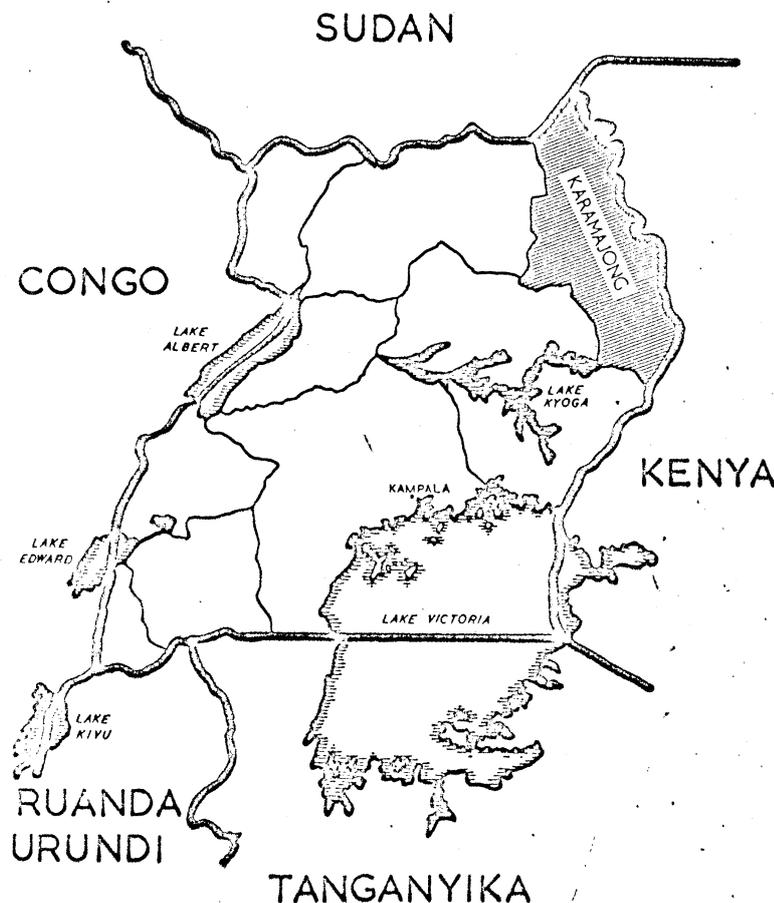


Fig 1.—Map of Uganda, showing Karamoja District in northeast of country.

carry out a community child health survey there, as it was anticipated that the disease pattern would differ from that seen elsewhere in Uganda,⁷⁻⁹ and it might be possible to relate the differences observed to the unique features of this particular ecosystem. From this, also, it might be possible to suggest measures to deal with the problems revealed.

The Ecosystem

1. Physical Features and Water Supply.

Karamoja district is made up of a plateau 3,700-4,500 ft above sea level. It is an area of 3,600 square miles, 35-20 miles east to west and 20-90 miles north to south. There is a rocky watershed which runs north and south through the region; to the west of this there is a central so-called riverine area, and further to the west, an area of flat plains.

The district is arid and barren, so that life revolves around problems of water supply for both human and cattle populations. The annual rainfall is approximately 25 in on the plains and 35 in on higher ground, but variations and irregularity of rainfall from year to year and in different localities are a feature of Karamoja. Significantly, seasons recognized by the Karamojong are related to

water—these being the period before the rains, the rains, the period before the dry season when the grass matures, and the dry season.

New sources of water are gradually being created by government and mission effort, and there are now some boreholes and dams. The "rivers," which are only filled transiently during the rains, flow westward, passing first down the steep slopes of the mountains, leaving occasional temporary rock pools, then flowing through a region of sandy river beds with steep sides, where much of the water sinks rapidly into the sand and can subsequently only be obtained in certain areas by digging shallow wells (Fig 2). After this, the rivers become wider with semipermanent waterholes, and finally they reach the western black clay plains where they merge from seasonal swamp into the permanent swamplands in Teso district.

2. Plant Life.—The eastern rocky highlands are covered with deciduous woodland and perennial grasses. The central region is the area of habitation, and here most of the perennial grasses have been destroyed by overgrazing and the sparse thorn trees (*Acacia sp*) have been stunted by goats and chopping for firewood. Near the usually dry

Fig 2.—Herd collecting to be watered from shallow well in dry river bed near permanent settlement.



river beds, however, large *Ficus* and tamarind trees remain. It is in this area that there are the permanent homesteads and adjacent cultivation plots of sorghum. These cultivation areas are especially on flood terraces, so that the production of crops is hazardous and related to the adequacy of the rainy season. In fact, there is a 1 in 3 chance that they will be just adequate for human needs and a 1 in 4 chance that the crops will fail entirely.³ These gardens of staple cereal are interplanted with species of cucumber, beans (*Phaseolus vulgaris*), small amounts of maize, and occasionally finger millet (*Eleusine coracana*).

3. *Human and Animal Life.*—The 80,000 Karamojong are mainly to be found in the zone of permanent settlement in the riverine area, which means that 80% of the human population live in one fifth of the land, with a population density of 60 per square mile. The other 20% of the Karamojong exploit the four fifths of the land to the west, which consists of arid grazing land, where the population density is only four per square mile.

Cattle: There are many more cattle than people—it has been calculated that there are usually 30 persons to a herd of cattle and approximately 200 beasts per herd. The livestock help the people to profit from the untitled 95% of the landscape, but this is done in a complicated way.

The large herds, with the men, lead a nomadic existence in the dry season in the grassland plains, the cattle exploiting the grass and water as best they can, and the men living largely on milk and blood. The small stock, comprising goats and sheep, and most of the milch cows remain in the settled zone to provide milk for the larger number of women and children. In 1956, the total stock belonging to the Karamojong was estimated at 200,000 cattle, 69,000 goats, 6,700 sheep, 4,000 donkeys, and 85 camels.³

The requirements of the cattle pull the herd towards the distant grasslands and water sources, while the needs of the humans in the permanent settlements pull the cattle in the other direction. Dyson-Hudson has described in detail the way in which the skilled

Karamojong pastoralists have solved this dilemma³—a solution which, however, separates the human population for the drier part of the year into women and children living on sorghum and milk in the homesteads and the adult males who accompany the main cattle herds in search of grazing and water and whose diet consists of milk and blood.

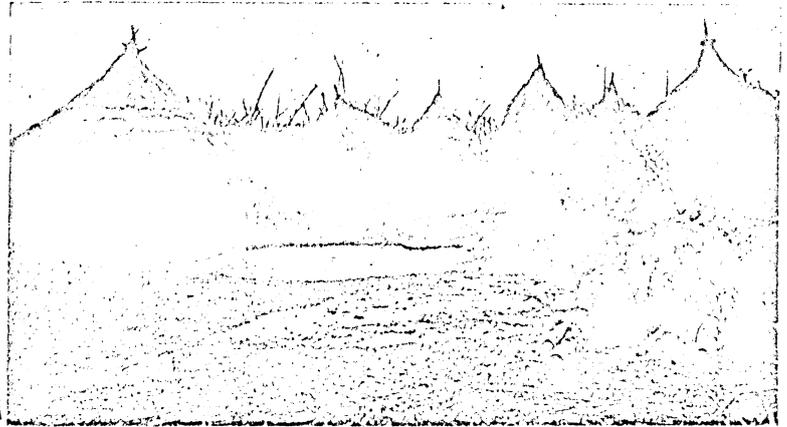
4. *Cultural Factors.*—The Karamojong are a "Nilo-hamitic" tribe, and their use of grazing land is more concerned with its natural resources than with permanent occupation. They are "cattle-complex" people, whose existence, nutritionally, psychologically, and culturally, revolves around their herds of stock. Cattle are their source of food, their wealth and bride-price, and, if gained by raiding adjacent tribes and preferably killing the herdsmen, their symbols of warrior prowess. Peaceful coexistence with neighboring tribes especially breaks down during drought periods when they attempt to utilize the same land for pasture or water as some other pastoral group. This fighting and cattle raiding between the Karamojong and the neighboring Suk has been an increasingly difficult administrative problem in this area for a long time.

The Karamojong men are distinguished by their lack of clothes, pierced edges of the ears, the nasal septum, and the lower lip, and a peculiar and intricately prepared "bun" of hair. The women wear a pleated skirt of skins and many heavy metal neck rings.

The Karamojong build permanent stockaded settlements (*manyatta*) in the riverine area—usually near to water-bearing stretches—and in those settlements the sleeping houses are arranged in a series of compounds or homesteads, each in turn made up of adjoining yards, huts, and storage granaries (Fig 3). A compound family has a number of these yards (*ekal*), and an extended family may form an entire stockaded settlement.

Men are usually responsible only for assisting in clearing the ground for cultivation, while other agricultural matters and child-rearing are in the hands of the women. Men, however, are principally concerned with the

Fig 3.—Huts in permanent settlement (*manyatta*), with adjacent granaries and sorghum drying on dung-smeared courtyard.



herding of cattle and boys with the herding of goats and calves and with scaring birds from the ripening crops.

5. *Food Habits.*—Babies are universally breast-fed, starting after cutting the umbilical cord, and butter or *ghee* (clarified butter) is given shortly after birth. If the mother has insufficient milk, the child may receive supplements of undiluted sheep's milk. As in most traditional African communities, breast-feeding is prolonged but, atypically, is continued through pregnancy until the next child is born. Fresh and sour milk, butter, and, on occasion, thick, gruel-like sorghum beer may be occasionally added to the child's diet in small quantity from 1 month of age. Sorghum porridge, soft meat, and beer are given more regularly at about 6 months. Thick sorghum "bread" (*atap*), meat, and beer sediment are included after 12 months. By 2 years, the child is eating all adult foods—which include sorghum porridge (thick or thin, and often mixed with sour milk or *ghee*), maize, and milk, either drunk or made sour by the addition of stale cow's urine. Home-prepared, sun-dried sour milk can be stored for a while and on occasion is also used to add to the porridge.

Blood is not a major food, especially for young children, and is only used at the settlements in starvation periods, and by the men at the cattle camps when it supplements the supply of milk. Cattle may be bled by venesection about once a month during the wet season, and more than two pints is sel-

dom taken from one animal (Fig 4).^{*} Meat is really a famine food and it is eaten barbecued, boiled, or dried in a form of biltong. Barbecued meat is, however, seldom well cooked.

Survey Method

A community child health survey was undertaken in various representative areas of Karamoja in January, 1962. Young children were examined at convenient collecting points (Fig 5) and older children were seen at scattered mission schools. Teams were accompanied by medical students as part of their field training in rural pediatrics¹⁰ and were based on mission stations in the districts. Methods employed were those used in other parts of Uganda and described elsewhere.^{7-9,11}

Results

A total of 1,047 children were examined, comprising 113 infants, 450 so-called pre-school age children, and 484 school children. Results are shown in Tables 1-7.

* A ligature is put around the neck of the animal, and when the veins are distended an arrow is shot into one from a distance of about one yard. The consequent flow of blood is caught in an open half gourd, defibrinated with a bunch of twigs, salt added, and the mixture is drunk by the participants. Often it is mixed with milk. Bleeding is done more frequently at the cattle camps when it forms a food for men, and therefore it is not a major item of food for children. Sometimes when it is done at the homesteads the women dry the blood clot and make it into blood meal for subsequent use in sauces to be eaten with sorghum.

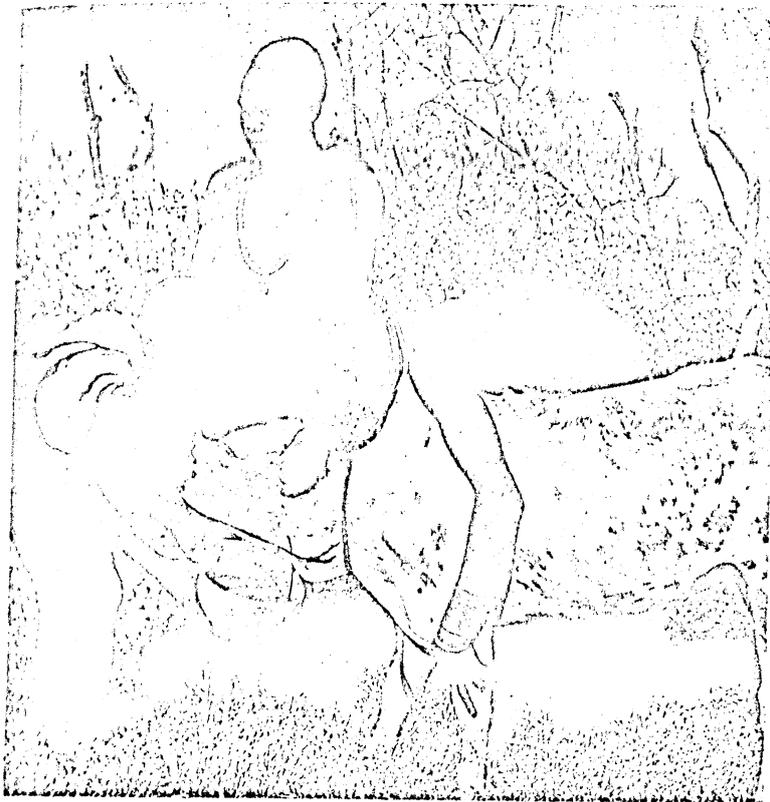


Fig 4.—Collecting blood from young bullock by venesection, performed with small-sized bow and arrow only used for this purpose.



Fig 5.—Mothers and children at collecting point. Pregnant woman at center is breast-feeding her infant. Older child by her left side shows mild protein-calorie malnutrition (judged by hypochromotrichia, and subnormal muscle and subcutaneous fat).

TABLE 1.—Skin Disease Among 1,047 Karamojong Children

	Fungus Infection		Scabies		Sores		Molluscum Contagiosum		Miliaria	
	No.†	%†	No.†	%†	No.†	%†	No.†	%†	No.†	%†
Infants (113)	1	0.8	24	21.2	8	7.1	1	0.8	1	0.8
Preschool-age (450)	17	3.8	42	9.3	48*	10.7	9	2.0	3	0.7
School children (484)	12	2.5	49	10.1	90†	18.6	9	1.9	4	0.8

* Tropical ulcer in 10 (21% of sores).

† Tropical ulcer in 21 (23% of sores).

Comment

The principal features of the Karamojong ecology have been outlined, and it is of interest to correlate the disease pattern of the children of this community with their environment and way of life.

Skin Disease (Table 1).—In this hot, dry, dusty region, water is in short supply and it has to be reserved initially for drinking, cooking, and watering the cattle (Fig 6). Bathing with water usually has to be an occasional luxury, and cow's urine is used for washing both people and utensils. Under

Fig 6.—Child watering cattle by scooping up water from shallow well in dry river bed. Situation ideal for transmission of Guinea worm.



these circumstances, then, the skin is continuously dirty, and this, together with the liability to trauma from thorns or insect bites, results in the high incidence of sores and tropical ulcers that is seen.

Likewise, the general uncleanness of the people of the community and their close contact with each other are related to the very frequent occurrence of clinically diagnosable scabies, especially in the case of infants, 21.2% of whom were affected, and who probably acquired their infections from their mothers while carried on their mothers' backs slung in a goat skin (Fig 7).

Nutrition (Table 2).—As weight standards are only available for genetically quite dissimilar Baganda, and as age assessment among the very unsophisticated Karamojong presents even more difficulty than usual in

Fig 7.—Infant carried on mother's back under goat's skin and in close skin-to-skin contact.



TABLE 2.—Nutritional Findings Among 1,047 Karamojong Children

	Kwashiorkor		Nutritional Marasmus		Hypochromotrichia		Bitot's Spots	
	No.+	%+	No.+	%+	No.+	%+	No.+	%+
Infants (113)	1 (Incomplete)	0.8	2	1.8	5/80	6.3	0	0
Preschool-age (460)	1 (Incomplete)	0.2	2	0.4	14/190	7.4	2	0.4
School children (484)	0	0	0	0	4/360	1.1	4	0.8

rural tropical communities, nutritional appraisal by weight was not possible, and assessment of malnutrition was made by examination for selected clinical nutritional indicators, as described elsewhere.^{7-9,11}

Results, confirmed by observation in local hospitals, showed the more severe syndromes of protein-calorie malnutrition to be uncommon. Thus, only one "incomplete" kwashiorkor was seen. This might be expected in view of the prolonged breast-feeding practiced, the use of cow's milk, and the relatively high vegetable protein (9%) staple, sorghum, in infant feeding. The children with marasmus also had associated possibly infective diarrheal disease, and this must be common in view of the limited, unclean water supply and the abundance of flies associated with the cattle. However, a relatively small number of younger children (6%-7%) showed the moderate hypochromotrichia often associated with lesser degrees of protein-calorie malnutrition,¹² and it is possible that, with such a seasonally varied and weather-dependent existence as that of the Karamojong, there could be much variation from one time of the year to another and from year to year.

However, although difficult to quantitate without local standards, it was apparent that

a principal burden of malnutrition rested on the younger "school-age" children of about 5-8 years, who were often not attending school, who without showing classical syndromes were plainly underweight and thin, with subnormal subcutaneous fat and muscle.

As usual in children in many rural African communities, there was no clinical evidence of scurvy, rickets, or specific vitamin lack, except for two preschool-age children and four school children with Bitot's spots. However, as noted by Darby et al,¹³ these lesions are not necessarily indicative of avitaminosis A, but can occur as a response to other factors, possibly including constant conjunctival trauma from sun, wind, and smoke.

Hemoglobin (Table 3).—It can be seen that, in common with many African communities with high malarial endemicity, the hemoglobin "community profile" is much worse in the preschool-age group than in infants or school children. Hemoglobin determination was by means of photolorimetry with Drabkin's solution. In view of the low incidence of hookworm infection and a sickle cell rate of only 1.9% (as judged by 637 tests), it is probable that this reflects the child's battle for immunity with the malarial parasite.

TABLE 3.—Hemoglobin Levels in 446 Karamojong Children

	Hemoglobin Levels, Gm/100 Ml									
	Less Than 5 Gm		5-7 Gm		Over 7-9 Gm		Over 9-12 Gm		Over 12 Gm	
	No.+	%+	No.+	%+	No.+	%+	No.+	%+	No.+	%+
Infants (51)	5	9.8	16	31.4	17	33.3	10	19.6	3	5.9
Preschool-age (166)	18	10.8	52	31.3	54	32.5	35	21.1	7	4.2
School children (220)	4	1.8	36	15.7	72	31.4	90	39.3	27	11.8

TABLE 4.—Prevalence of Malaria as Shown by Thick Blood Films

	Infants (70)		Preschool Children (250)		School Children (312)	
	No. †	% †	No. †	% †	No. †	% †
<i>Pl falciparum</i>	5	7.3	13	5.2	13	4.2
<i>Pl malariae</i>	20	28.6	142	56.8	110	30.1
<i>Pl falciparum</i> & <i>Pl malariae</i>	9	12.9	43	17.2	13	4.2
All species	34	48.6	198	79.2	145	46.5

Malaria.—Thick blood films showed 48.6% positives for malarial parasites among the infants, 79.2% among the preschool-age group, and 46.5% among the school children (Table 4). This relatively high degree of endemicity is also reflected by the finding of palpable spleens † in 30.1%, 54.7%, and 59.5% in the three age groups (Table 5) and by the high frequency of hepatomegaly,

† A minor cause of error in evaluating the significance of the spleen rate was that Karamoja is an endemic area for kala-azar, although the disease is not widespread.

Fig 8.—Malarial hepatosplenomegaly (outlined in chalk).

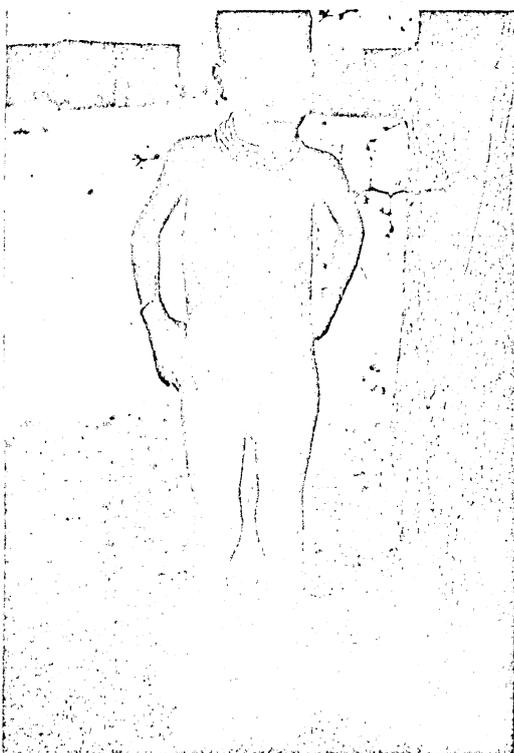


TABLE 5.—Spleen and Liver Rates Among 1,047 Karamojong Children

	Palpable Spleen		Palpable Liver	
	No. †	% †	No. †	% †
Infants (113)	34	30.1	12	10.6
Preschool-age (450)	246	54.7	147	32.7
School children (484)	288	59.5	137	28.3

which is most commonly the resultant of malaria in tropical children, if this condition is endemic (Fig 8).

A surprising finding was the commonness of infection with *Plasmodium malariae* (quartan malaria), although this has been shown to be much more prevalent than previously appreciated in most areas of Uganda.¹⁴ As noted earlier, the permanent homesteads, where the younger children stay, are relatively near to such water holes as may be present. The frequency of relapse in quartan malaria, and also the fact that it seldom kills the host, may be additional factors favoring the high incidence in the Karamojong scene, where vector breeding presumably must be predominantly in the rainy season.

Intestinal Parasites (Table 6).—Small samples of stools were collected directly from preschool-age children by the anal tube technique,⁹ while samples were brought in by the school children. Examination was carried out by direct smear alone; no concentration method was employed.

The high incidence of ova of *Taenia saginata* is undoubtedly related to the large number of cattle and the absence of any attempt to dispose safely of human feces. Meat is most often barbecued superficially over the embers of the fire, and children are given meat when they have one to two teeth. Tapeworm (*cpole*) is a well-recognized entity by the Karamojong.

The amebiasis found could easily be acquired in the Karamojong setting by the unwashed hands, the limited unclean water supply, and flies. The low incidence of infection with the hookworm and the apparent absence of ascariasis are noteworthy, and presumably may be related in part to an in-

TABLE 6.—Prevalence of Intestinal Parasites in 378 Karamojong Children

	Infants (21)		Preschool Children (118)		School Children (239)	
	No.†	%†	No.†	%†	No.†	%†
Ova of:						
<i>Enterobius vermicularis</i>	1	4.8	17	14.4	6	2.5
<i>Taenia saginata</i>	2	9.5	7	5.9	26	10.9
Hookworm	—		1	0.9	11	4.6
Cysts of:						
<i>Entamoeba histolytica</i>	—	0	13	11.0	27	11.3
<i>Giardia lamblia</i>	—	0	5	4.2	6	2.5
Rehabditiform larvae of:						
<i>Strongyloides stercoralis</i>	—	0	1	0.9	—	0
Mixed infections:						
Ova of <i>E. vermicularis</i> & <i>T. saginata</i>	1	4.8				
Ova of <i>E. vermicularis</i> & <i>E. histolytica</i> cysts			2	1.7		
Ova of <i>T. saginata</i> & <i>E. histolytica</i> cysts			1	0.9		
All species of parasites	4	19.1	47	39.8	76	31.8

ability of ova and larvae of these parasites to survive on the hot, dry soil. The presence of *Enterobius vermicularis* ova in stool samples of 14% of preschool-age children was unexpected, as eggs of this helminth are, for the most part, laid on the perineum and not in the intestinal lumen, and this parasite is usually considered to be relatively uncommon in many traditional African circumstances.

Eye Disease (Table 7).—The most striking positive finding was the high incidence of conjunctivitis, much of which may have been due to early trachoma, although it was not practicable in the field to evert the upper lid to look for the pathognomonic conjunctival nodules. The spread of both bacterial conjunctivitis and trachoma, especially within a family, would be facilitated by flies, dust, and lack of water for washing, while chronic conjunctival trauma also would result from the glare of the sun, smoke, and dry wind. Certainly, obvious clinical trachoma was common in adults, not infrequently with entropion, conjunctival scarring and blindness (Fig 9).

Miscellaneous Clinical Findings.—Local dependence on indigenous methods of disease prevention and of cure is shown by the high incidence of infants with charms, and by the increase with age of children with medical incision patterns, which had been applied by local healers. This is logical prophylaxis and therapy in the Karamojong

cultural setting as, in common with many remoter rural African communities, disease is believed to be due to supernatural, ultra-human forces. In particular, mothers recognize the evil eye (*akapil*) as a potent pathogen, and the enlargement of the spleen (*etid*), easily palpable and visible, through the young child's thin abdominal wall, is well-known.

Scabies (*nyip*), tapeworm (*epele*), leg ulcers (*ajeme*), and jiggers (*ngimuj*) are also recognized. In addition, the commonest medicinal scar pattern in school children was across the upper abdomen, which was stated to have been done for *lokapet* (a culturally defined illness with swelling of the upper abdomen and no obvious scientific equivalent).

The traditional healer (*emuron*) employs magical methods and herbs. Diagnosis, as usual in prescientific people, is by "divination," that is, the discovery of the person responsible for the bewitchment or what evil spirits have been outraged.¹⁴ Among the Karamojong, divination takes the unusual form of sandal casting, where the diagnosis by the *emuron* depends on the direction in which a pair of local cowhide sandals fall when thrown.

Burns, either newly acquired, or in the form of scars, were seen in 5% of infants and indicate the high risk to a young child of the ground-level cooking fire in the lean-to shelter that serves as kitchen. Caries are uncommon in early childhood, and, although

TABLE 7.—Miscellaneous Positive Findings in 1,047 Karamojong Children

	Burns		Conjunctivitis		Medical Incisions		Vaccinations		Charms		Congenital Abnormalities		Corneal Scars	
	No.+	%+	No.+	%+	No.+	%+	No.+	%+	No.+	%+	No.+	%+	No.+	%+
Infants (113)	6	5.3	40	35.4	12	10.6	0	0	23	20.4	1	0.8	0	0
Preschool children (450)	6	1.3	117	26.0	106	23.3	12	2.7	55	12.2	7	1.6	4	0.9
School children (484)	2	0.4	139	28.7	160	33.1	69	12.2	10	2.1	10	2.1	9	1.9

PAS indicates preauricular sinus.

not nearly as frequent as in the Western world, the higher rate in school children may be related to the rather more refined diet, including maize flour, that those who were boarders were receiving.

Apart from so-called umbilical hernias, which have been shown to be due to a higher incidence of skin-type neonatal umbilicuses in many African peoples than in Caucasians,¹⁵ the only congenital abnormality noted was the preauricular sinus, which is common in many African communities. Of equal interest was the apparent absence of extra digits, a genetically transmitted anom-

ally occurring frequently in some African groups, as among the Baganda who show 0.9%-1.4% incidence.¹⁶

Conclusion

As had been shown, the major ecologic features of the Karamojong setting which influence the pattern of the child health and disease are the lack of water and the large number of cattle and flies.

Criticism of the present short-term prevalence survey, as with any study of this type, is that it was carried out at one period of one year (in this instance in January to-



Fig 9.—Chronic trachoma with entropion in mother, with conjunctivitis, probably due to early trachoma, in her son.

Ear Discharge		Caries		Umbilical Hernia	
No.†	%†	No.†	%†	No.†	%†
0	0	0	0	7	8.2
7	1.6	13	2.9	37	8.2
2	0.4	80	16.5	28	5.8

wards the end of the hot, dry season), and does not give any idea of the frequency of short-term illnesses, as, for example, respiratory infections or tetanus of the newborn. However, the Karamojong environment is such that a heavy infant mortality, especially from infection, may be assumed.

Likewise it was possible to anticipate other disease problems likely to occur in these ecologic circumstances, and these might be expected to include infective diarrhea (related to the lack of water and flies), brucellosis, tetanus and anthrax (related to cattle), trauma (especially resulting from herding activities and from cattle raids), Guinea worms (from the water taken from wells and pools), and periodic severe undernutrition from the precarious rainfall.

Despite the general unreliability of local statistics in Karamoja, because of diagnostic difficulties, the limited staff and laboratory facilities, poor communications, and a willingness to attend with only certain types of disease, analysis of attendance figures at Moroto Hospital for 1961 showed these predictions of the disease pattern to be in general correct.

The principal causes of admission for all age groups combined were trauma (14%), clinically diagnosed dysentery and other diarrheal disease (11%), pneumonia (including an epidemic of whooping cough) (8%), and advanced trachoma requiring operation for entropion (6%). Occasional cases of tetanus, anthrax, brucellosis, and kala-azar were admitted throughout the year.

Outpatient cases were dominated by the treatment of pneumonia and respiratory infections (7%), conjunctivitis (including

trachoma) (4%), diarrheal disease (3%), skin infections (especially scabies, tropical ulcers, and Guinea worm lesions) (2%), and tapeworm infection (0.6%). No case of sickle cell anemia had been detected in the previous year, and clinically significant infection with either the hookworm or the roundworm was most uncommon.

However, despite the present high incidence of childhood disease, measures intended to ameliorate the situation should be introduced only after careful thought. The Karamojong are deeply attached to their cattle-centered way of life and system of values, and their existence, although precarious, is, in fact, a time-tested attempt to extract a maximum sustenance from a harsh, unpromising terrain. Under these circumstances, school education does not necessarily have much to offer unless new economic opportunities develop in a parallel fashion, as is, in fact, occurring with the government's Development Plan for Karamoja, with its proposed emphasis on stock rearing.

Plans to improve the health and welfare of the Karamojong must deal initially with such priorities as facilities for the early treatment of conjunctivitis (including trachoma ‡) and tropical ulcers (possibly by means of mobile dispensaries), improved water supplies in the form of tube wells and boreholes, and veterinary measures to reduce cattle disease. However, at the same time, care should be taken to ensure that aspects of Karamojong tradition that are scientifically beneficial are not interfered with.

Summary

The ecology of the Karamojong people of northeast Uganda is described. The main feature is the constant search for water and

‡ Eagerness by Karamojong for treatment of conjunctivitis and trachoma was evident during the present survey. An antitrachoma campaign based on broad-spectrum antibiotic eye ointment and possibly intramuscular antibiotics or sulfonamides, would, under present circumstances, have to be a continuing one to avoid community relapse. Possibly the recently produced trachoma vaccine may represent a practicable solution.

grazing in this arid region for their cattle, which dominate the scene culturally and nutritionally.

A community child health survey was carried out and 1,047 infants, preschool-age, and school children examined. The pattern of disease related well to the ecology, with conjunctivitis and trachoma, skin infections (in the form of scabies and tropical ulcer), tapeworm infection, and malaria as the most important problems.

Investigation of hospital attendances also showed a high incidence of certain acute conditions not likely to be found in a short-term field study, including diarrheal disease, often in the form of dysentery, trauma, and such cattle-associated infections as tetanus, anthrax, and brucellosis.

Father N. P. Traversi of the Verona Father's Mission, Kangole, and Rev. P. G. Cartwright, Moroto, arranged for this field survey. Dr. A. Norman, Institute of Child Health, Great Ormond Street, London, gave assistance.

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