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unknown size also resides in the area. The population is made up of mixed ethnic groups. The main occupations are farming, trading, fishing and cattle rearing. The religions are Islam and Christianity.

The health care delivery facilities are few and scattered and organized by different agencies, e.g. national, state, local governments and missionaries. Dispensaries are the only health care facilities in the rural areas.

Research method

Eight villages located in 10% randomly selected habitable units of the Kainji Lake area were chosen for the study. There were 4652 people (2284 males and 2368 females) in 1091 households in the eight villages. The selection of the villages, their characteristics and the age and sex distribution of the inhabitants have been described previously [2]. Ten per cent of the households were finally included in the survey for anthropometric measurements (height and weight), blood pressure measurements, and clinical examination.

Survey procedure

The survey was carried out from February to November 1982 and conducted by a nursing superintendent, three field staff and the author. All the staff were trained for about 2 weeks in their different roles in the survey and a pretest was organized to ascertain their competence before the start of the survey itself.

Each individual in the study was first registered by one of the field staff by name, age, sex and occupation, after which he or she was measured for height and weight. The height measurements were as described by Jelliffe [3]. To measure the weights of infants and small children, an adult of known weight was asked to carry the child and stand on the weighing scale in the same posture as when his or her own weight was measured. The weight of the child was the difference between the new weight and the known weight of the adult.

After anthropometric measurements, each individual was interviewed about current illnesses. The interview was conducted by a nursing superintendent who had worked for many years in many of the dispensaries and

health clinics and was familiar with the common illnesses in the area. The symptoms were recorded in the order in which they were presented. Only spontaneous responses were recorded. In addition, all parents were asked about any illness in their children. Information was sought only for children under 10 years of age.

After the interview, each individual was examined system by system, as follows: conjunctiva was examined for pallor, presence of xerosis and keratomalacia; the mouth for angular stomatitis, cheilosis, glossitis, hypertrophic gums; and the teeth for dental caries, calculi, pyorrhoecia, mottled enamel and enamel hypoplasia. The chest was examined for any abnormality in shape, palpable mass, pathological breath sounds and heart murmurs; the abdomen for tenderness, umbilical hernia, spleen and liver enlargement, and any palpable mass; and the skin for hyper- and hypo-pigmentation, nodules, follicles and oedema. The axillary, femoral, parotid and thyroid regions were specifically palpated for lymphatic and glandular enlargements. Children under 5 years of age were examined for frontal or parietal bossing, persistent anterior fontanelle and epiphyseal enlargements. Finally the blood pressure of every person was taken twice according to the method described by Akinkugbe & Ojo [4] and the average recorded. The clinical examination, including the measurement of blood pressure, was carried out by the author. The author supervised collection, coding, and analysis of data, and carried out classification of diagnosis.

Results

In total, 490 respondents (247 males and 243 females) were examined and questioned. Table 1 shows the prevalence of diseases in percentages. Fevers (50.2%), gastro-enteritis (37.1%) and chest infections (10.0%) were the most prevalent of the diseases identified and the pattern of all the three diseases was the same in the 'southern' villages of Karabande, Monai, Shagunu, Awuru, Oli and Sabonpegi. In the 'northern' villages of Papiri and Kokoli, skin diseases were next in frequency to fevers and gastro-enteritis. The less common diseases were conjunctivitis, urethritis, cardiac failure, onchocerciasis, nutritional disorders and septicemia.

A health examination survey of morbidity in rural Nigeria

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Summary

A health survey to describe the morbidity pattern of a rural population in Nigeria was conducted among a 10% random sample of 1091 households in the Kainji Lake area of Nigeria. The diseases most frequently encountered were fevers, gastro-enteritis and chest infections, with prevalence rates of 50.2%, 37.1% and 10.0% respectively. Dental debris, conjunctival pallor, missing teeth and dental calculi were present in 65.8%, 59.1%, 32.2% and 24.1% respectively. The adult males were found to be significantly taller and heavier and with higher blood pressure than the females. Most of the health problems were attributed to various types of infection, but unhealthy social habits, lack of sanitation facilities and poor personal hygiene could have contributed to the overall morbidity in the population. Control of communicable diseases, community mobilization towards provision of basic sanitation facilities, good housing and dental hygiene were recommended to be included in health planning for the Kainji Lake area population.

Résumé

Une étude visant à décrire la modèle de morbidité dans une population rurale au Nigéria a été menée parmi un échantillon au hasard de 10% de 1091 maisonnettes dans la région du lac Kainji au Nigéria. Les maladies plus fréquemment rencontrées sont fièvres, gastroenterites et les infections de la poitrine avec prédominances (des incidences) de 50.2%, 37.1% et 10.0% respectivement. Les débris dentaires, la pâleur conjunctivale, les dents manquants et le calcul dental étaient présents à 65.8%, 59.1%, 32.2% et 24.1% respectivement parmi ceux qui ont subi des examens cliniques.

Les hommes adultes étaient significativement de plus haute taille et plus lourds et avec plus haut de pression cardiaque que les femmes. La plupart des problèmes sanitaires étaient attribués aux origines infectieuses mais des coutumes sociaux malsains, le manque des facilités sanitaires et la mauvaise hygiène sont peut-être des facteurs qui contribuaient à la morbidité totale dans la population. Le contrôle des maladies contagieuses, la mobilisation de la communauté vers la provision des équipements de santé et l'éducation sanitaire visant à l'hygiène dental et l'hygiène au foyer étaient recommandés à être inclus dans la planification sanitaire de la population du lac Kainji.

Introduction

The only sources of morbidity data in the rural population of Kainji Lake area are the dispensaries but such data have been found to have defects which limit their use in health planning [1]. The present study attempts to provide true morbidity data of the Kainji Lake population which the author hopes will prove useful for proper planning of health care delivery for the 44,000 displaced people who were resettled in the Kainji Lake area in 1968.

Study area

The Kainji Lake area is located approximately between latitudes 9°40' and 11°08' north and longitudes 4°39' and 4°54' east at the northern border, 4°15' and 4°454' east at the widest points and 4°51' east at the southern border. In 1968 about 44,000 people were displaced by the creation of the Kainji Lake and resettled in 139 villages and two towns. In addition to those who were resettled, a large population of

Table 2 shows the prevalence of diseases in percentages by age groups and shows that the prevalence of chest infections generally increased with age. It also shows that the prevalence of fevers was high in adults (≥ 15 years) and infants; gastro-enteritis, conjunctivitis and skin diseases were high in infants, urethritis higher in adolescents, cardiac failure and onchocerciasis higher in adults (≥ 15 years).

Table 3 shows the prevalence by percentage of the significant clinical findings on examination of the population by age groups. The table shows that dental debris was present in 65.8%, while conjunctival pallor occurred in 59.1%. Missing teeth (32.2%), dental calculi (24.1%), hepatomegaly (17.5%) and splenomegaly (10.1%) were the other clinical findings detected. The table also shows that the prevalence of conjunctival pallor and dental debris generally increased with age from infancy to adolescence but reduced in adulthood. The prevalence of dental calculi and missing teeth increased with age but that of hepatomegaly and splenomegaly decreased with age.

Table 4 shows the distribution of heights and supine lengths, weights, and systolic and diastolic blood pressures by age and sex in the population. The table shows that each of the measures increased generally with age in both sexes. The table also shows that the value for females was higher than that for males in all age groups except for the adult; the differences,

however, are not significant ($P > 0.05$). The values for adult males were significantly higher ($P < 0.05$) than those for females for height and weight.

Discussion

Analysis of the data derived from the dispensaries in Kainji Lake area shows that fevers, gastro-enteritis and chest infections are the leading causes of morbidity in that area [1]. This confirms the reports from the dispensaries; similar findings have also been reported previously in rural Ghana [5] and rural Camerouns [6].

In addressing the causes of fevers, Downs [7] thought that malaria was largely responsible for many febrile illnesses in hyper-endemic communities in Africa. Fasan [8] claimed that malaria was responsible for febrile illness and a high morbidity rate among all age groups, especially in children under 15 years of age, but admitted that the effect of malaria morbidity in the adults in a highly endemic area was difficult to assess because of the co-existence with many viral and bacterial communicable diseases. Subsequent reports by Moore *et al.* [9] and Fagbami [10] on several arboviral diseases in Nigerians confirmed that arboviruses could be important causes of febrile illness in Nigeria. Furthermore, Alausa [11,12] has also reported on the

Table 2. Age (years)-specific prevalence of illness in percentage in sampled population of all villages of study

Disease categories	< 1	1-4	5-9	10-14	≥ 15	Total
Fevers	44.4	24.0	37.8	35.4	66.8	50.2
Chest infections	0	4.0	4.5	12.1	13.4	10.0
Gastro-enteritis	100.0	26.0	41.4	46.3	31.9	37.1
Conjunctivitis	11.1	2.0	1.8	2.4	10.0	6.5
Skin diseases	11.1	10.0	4.5	7.3	6.3	6.5
Nutritional disorders	0	2.0	0	1.2	0.8	0.8
Urethritis	0	0	7.2	15.9	1.3	4.8
Cardiac failure	0	0	0	1.2	4.2	2.2
Onchocerciasis	0	0	0.9	1.2	0.4	0.8
Septicaemia	0	4.0	0	1.2	0.4	0.8
Others*	22.2	2.0	0	2.4	1.3	1.6
No. of people examined	9	50	111	82	238	490

*Includes hydrocephalus, undescended testis, arthritis, etc.

Table 1. Morbidity pattern and the prevalence of disease among the population examined in individual villages of study

Disease categories	Karabande	Monai	Shagunu	Awuru	Oli	Sabonpegi	Papiri	Kokoli	Total
Fevers	58.1	53.8	47.0	49.0	33.3	51.9	58.5	36.0	50.2
Chest infection	10.5	11.5	10.8	8.2	12.1	16.5	4.6	4.0	10.0
Gastro-enteritis	32.4	42.3	50.6	24.5	27.6	45.6	23.0	46.0	37.1
Conjunctivitis	10.5	7.7	6.0	6.1	15.2	5.1	0	4.0	6.5
Skin diseases	6.7	0	8.4	4.1	9.1	7.6	6.2	6.0	6.5
Nutritional disorders	0.95	0	2.4	0	0.3	0.3	0	0	0.8
Urethritis	1.9	0	2.4	0	3.0	1.3	0	0	4.8
Cardiac failure	6.7	0	2.4	0	0	1.3	1.5	0	2.2
Onchocerciasis	0.95	0	3.6	4.6	6.1	0	0	0	1.6
Septicaemia	0	0	2.4	0	0	1.3	1.5	1.5	0.8
Others*	2.9	0	0	4.1	0	0	3.1	2.0	1.6
No. of people examined	105	26	83	49	33	79	65	50	490

*Includes hydrocephalus, undescended testis, arthritis.

Table 4. Distribution of height, weight and blood pressures (systolic and diastolic) in mmHg by age and sex in the population

Age group (years)	Height		Weight		Blood pressure				No. examined		
					Systolic		Diastolic				
	M	F	M	F	M	F	M	F	M	F	Total
< 1	65.5	74.00	7.2	8.0	—	—	—	—	5	4	9
1-4	85.6	83.7	11.8	10.4	—	—	—	—	24	26	50
5-9	115.2	115.9	19.2	20.2	95	95.4	57.8	59.4	58	53	111
10-14	138.1	139.4	32.7	34.7	105.5	107.8	62.5	64.8	46	36	82
≥ 15	167.2	158.5	60.2	54.8	125.5	122.8	78.4	76.4	114	124	238
All ages	138.0	141.0	39.7	41.6	118.5	116.5	73.3	71.7	247	243	490

M, Male; F, female.

Table 3. Percentage prevalence of significant clinical findings by age groups (years) on examination of the sampled population

Physical findings	< 1	1-4	5-9	10-14	≥ 15	Total
Eyes						
Pale conjunctiva	33.3	60.0	67.9	69.4	5.3	59.1
Conjunctiva xerosis	0	0	0	0	0.4	0.2
Keratomalacia	0	0	0	1.2	0.4	0.4
Mouth						
Angular stomatitis	0	0	0	1.2	0	0.2
Cheilosis	0	0	0	1.2	0.4	0.4
Glossitis	0	0	0	0	0.4	0.2
Hypertrophic and hyperaemic gums	0	0	0	1.2	0.4	0.4
Teeth						
Debris	11.0	40.0	77.78	88.5	66.5	65.0
Dental calculi	0	6.0	22.8	24.7	31.7	24.1
Pyorrhoea	0	2.2	1.8	0	2.6	1.8
Mottled enamel	0	0	8.3	5.9	5.7	5.4
Enamel hypoplasia	0	2.0	1.8	1.2	2.2	1.8
Missing tooth	0	0	1.8	2.4	68.7	32.2
Heart murmurs	0	2.0	0	2.4	0	0.6
Abdomen						
Umbilical hernia	0	6.0	2.8	2.4	0	1.6
Splenic enlargement	22.0	14.0	17.4	15.3	2.2	10.1
Liver enlargement	33.3	20.0	30.3	24.7	5.7	17.5
Skin						
Follicular hyperkeratosis	0	0	0.9	0	0.88	0.6
Hypo-pigmentation	0	2.0	0	2.4	3.1	2.0
Oedema	0	0	0	0	0	0
Pellagrous dermatosis	3.0	2.2	0.9	0	0.44	0.0
Skeleton						
Frontal or parietal bossing	0	2.0	0	0	0	0.2
No. of people examined	9	60	111	82	238	490

significance of human brucellosis on febrile illness in the Nigerian population.

With respect to Kainji Lake area, Waddy [13] has described the study area as holoendemic for malaria. Malaria is therefore probably the major cause of febrile illness from infancy to adolescence in this study but may not be the major cause of fever in the adult population who should have developed considerable immunity.

The occurrence of fevers in the adult population could be due to other organisms, e.g. brucella and arboviruses which had been identified earlier in the population [2,14].

In discussing the high prevalence of chest

infections, Adekolu-John [2] reported on the social habits of cooking inside the rooms and permanently blocking windows in most of the rooms studied in the population, habits which result in reduction of ventilation and production of smoke in the living rooms. These social habits probably caused the high rate of chest infections recorded in this study. Furthermore, the cumulative effect of poor ventilation and exposure to smoke could probably explain the increase of chest infection with age in this study.

The high prevalence of gastro-enteritis could be a result of the insufficient basic sanitation facilities already described for this area [2] but

useful basic morbidity information for planning and evaluating health programmes than a sickness survey could achieve. The shortcoming, of course, is the extreme cost. Therefore this survey should be limited to sample surveys and conducted at long intervals.

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in children it could, in addition, be due to malaria as gastro-enteritis has been known to present commonly in children with *Plasmodium falciparum* in holoendemic malaria [15].

This study has shown that skin diseases are the third commonest disease in the 'northern' villages of Papiri and Kokoli and thus suggests regional differences in the morbidity pattern in the population. The skin problems most prevalent are pruritus and abrasions. The villages (Papiri and Kokoli) are populated by the Kamberis, an ethnic group that are traditionally half clad. The skin diseases found could be a result of bodily exposure to injuries and infections.

Clinically, the distribution of conjunctival pallor, hepatomegaly and splenomegaly in this study follows generally the clinical presentations of malaria in an holoendemic area. Malaria is probably the cause of the high prevalence rates of these clinical manifestations in the population.

Dental debris was present in 77.8–83.5% of the population aged 5–14 years. This finding is higher than the 54.2–75.3% reported for an equivalent age group at Ibadan, Oyo State of Nigeria, by Oduntan [16] and suggests a poorer state of oral hygiene. The prevalence of missing teeth and dental calculi could be due to the prolonged effects of dental debris on dentition in the population.

The pattern of heights and weights where no significant differences were found below 10 years of age is in agreement with that of Edozien [17] for the Yoruba boys and girls. In adolescents and adults the findings are in agreement with those reported for Nigerians by Johnson [18,19] who found no significant sex difference in the heights and weights of the adolescents but found that the adult males were significantly heavier than the females.

In spite of the agreement between the pattern of heights and weights reported here and the findings elsewhere in Nigeria, malnutrition is known to exist in the population. Studies on the types and degree of malnutrition, using height for age [20], weight for age [21], and weight for height [20], among children below 10 years of age, have shown that 58.4% of the children were chronically malnourished, 65.9% acutely malnourished and 46.1% currently malnourished, and that 15.3%, 5.3% and 8.3%, respectively, were severely malnourished in the

three different malnourished states (anthropometric indices of nutritional states of Kainji Lake population, Adekolu-John, in press). The cause of the malnutrition was ascribed to the low protein and calorie content of the diets. However, in this study, malaria, chest infections and gastro-enteritis have been shown to be highly prevalent in children. These diseases could act synergistically with a low nutrient intake and be responsible for the poor nutritional state [22].

The low prevalence of clinical hypovitaminosis (conjunctival xerosis, keratomalacia, angular stomatitis, cheilosis, glossitis, follicular hyperkeratosis, etc.) is in keeping with the adequate vitamin intake reported earlier [23].

The age and sex distribution of systolic and diastolic blood pressures is in agreement with the observations of Akinkugbe & Ojo [4] for Eruwa, Oyo State of Nigeria, and Oyediran *et al.* [24] for Epe, Lagos State of Nigeria. Previous analysis of the data presented in this study has shown that the prevalence of hypertension (4.0%) was low compared to over 9.1% reported for Eruwa by Akinkugbe & Ojo [4].

This study has identified the predominant health problems in the area to be infectious in origin but has also highlighted the effect which unhealthy social habits, lack of sanitation facilities and poor personal hygiene could have on the overall morbidity in the population. Any health planning for the Kainji Lake population should include programmes on control of communicable diseases, community mobilization for provision of basic sanitation facilities and health education. The health education should focus on the health hazards associated with the habits of closing the windows and cooking inside the room. A health educational programme should focus on dental hygiene and be directed specifically at children of school age since the highest prevalence of dental debris occurred within this group. This should reduce the prevalence of missing teeth, dental debris and calculi in the population.

Sickness surveys have been useful in identifying factors important in the utilization of health care facilities but are incapable of identifying all the factors in a rural population, like Kainji, with poor access to regular medical service. Lack of health care could limit the ability of the population to describe their symptoms accurately. The present survey has provided more