ガーナ国野口記念医学研究所
プロジェクト
巡回指導調査団報告書

平成元年9月

国際協力事業団
医療協力部

序　　文

ガーナ国野口記念医学研究所プロジェクトは、ウィルス学、栄養学及び疫学の3分野を協力対象として、昭和61年10月から5ケ年にわたる協力を開始した。

今般、当事業団は、開始から第4年次に入った本プロジェクトのこれまでの進捗状況を把握し、今後の効果的実施を図るべく、平成元年7月31日から8月14日までの間、巡回指導調査団を派遣した。

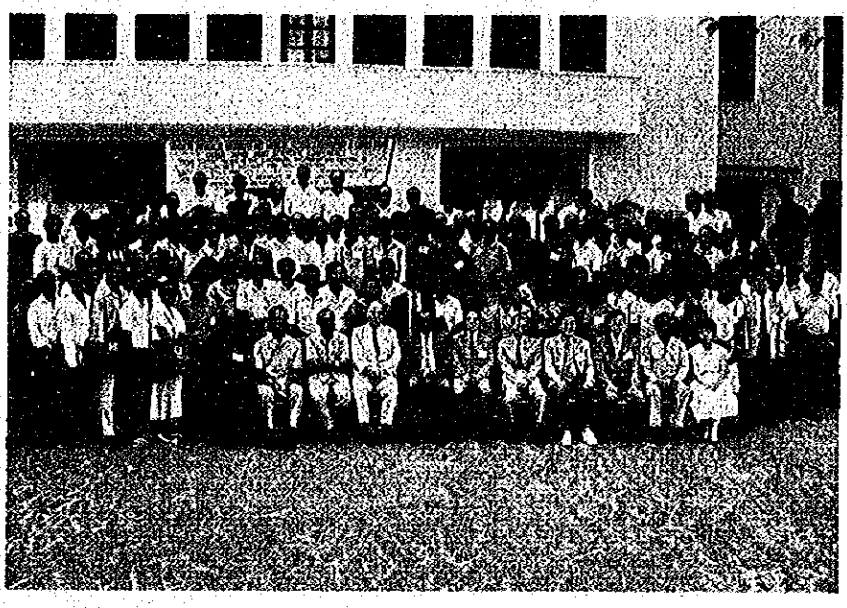
本報告書は、上記調査団の調査結果を取り纏めたものである。

ここに、本プロジェクト実施において、御協力いただいている関係各位に深甚なる謝意を表するとともに、今後とも御支援を賜るようお願いする次第である。

平成元年7月

国際協力事業団
医療協力部長　近　藤　健　文

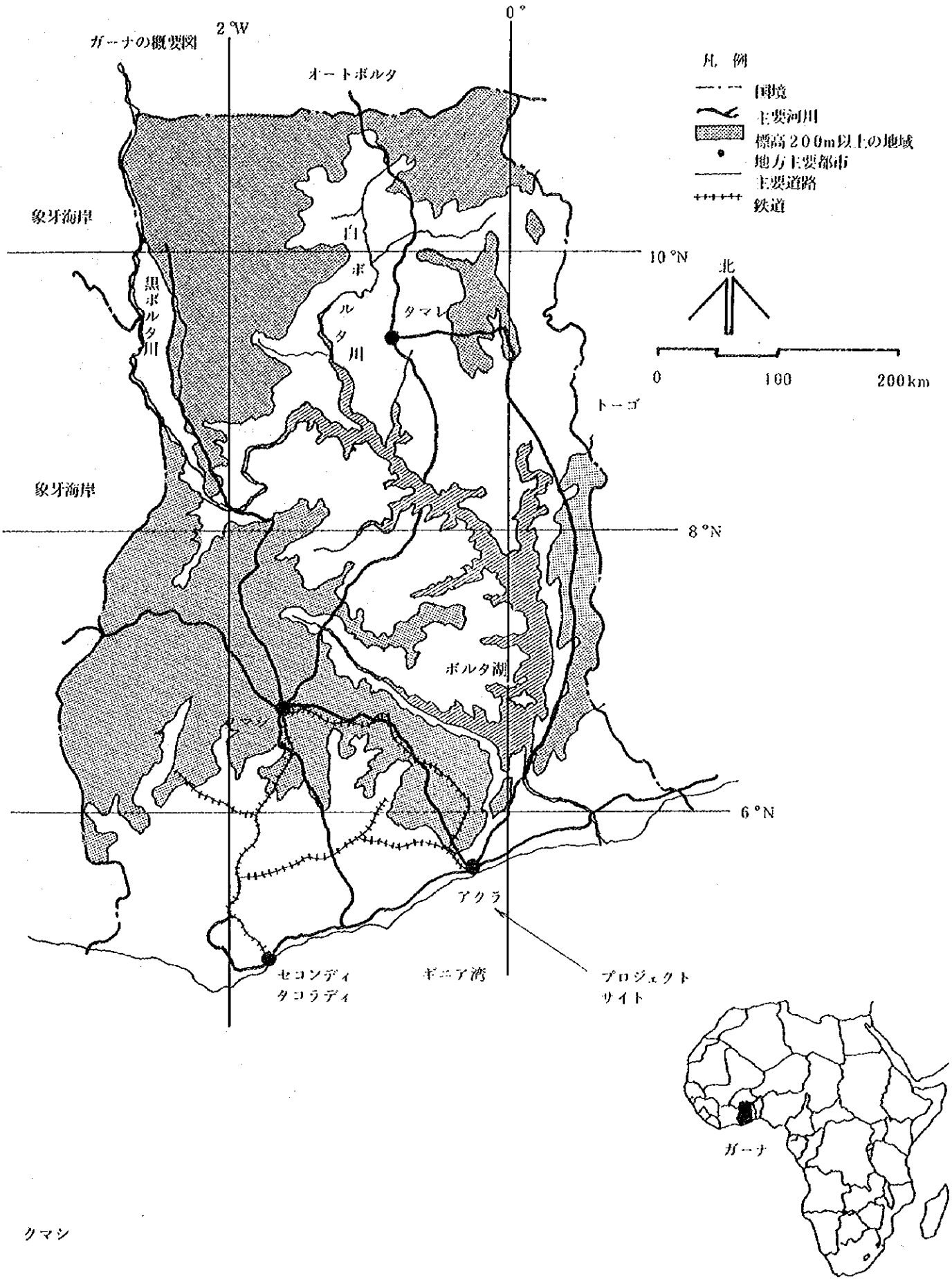
野口記念医学研究所



GHANA－JAPAN
JOINT SCIENTIFIC
CONFERENCE
終了後参加者とともに記念

Coordinating
Committee Meeting
における ガーナ側との協議

Notes on Discussions
署名後


ガーナの概要図
2 °W
0 °
オートボルタ
凡 例
国境
主要河川
標高200m以上の地域
地方主要都市
主要道路
鉄道
象牙海岸
白ボルタ川
黒ボルタ川
10 °N
北
タマレ
0
100
200km
トーゴ
象牙海岸
8 °N
ボルタ湖
クマシ
6 °N
アクラ
セコンディ
タコラディ
ギニア湾
プロジェクトサイト
ガーナ

クマシ

目　　次

I. 巡回指導調査団の派遣

1－1 調査団派遣の経緯と目的

ガーナ国では、熱帯地方特有の感染症が蔓延し、当時の保健医療行政も、ガーナ経済不振の為十分ではなく、医療事情は、劣悪な状況にあった。時に医師をはじめとする医療従事者が極めて少数であり、同国は、医療分野全体の整備充実を図る為、我国に医療協力の要請越した。これに対し我国は、昭和43年からガーナ大学医学部に対し技術協力を開始し、「ウィルス学と電子顕微鏡」—第1次—、「低栄養と感染症」—第2次—、「病態生理学と免疫学」—第3次—、をテーマに研究基盤の整備を行った。この成果を踏まえ、昭和52・53年度無償資金協力（計10億円）によりガーナ大学医学部付属野口記念医学研究所が昭和54年11月に新設され、昭和55年3月からは、「下痢症と低栄養」—第4次—をテーマに6年間にわたる研究協力を行なった。この技術協力の結果、研究所としての基盤がある程度整ったが、この基盤をもとにガーナ国は、保健行政に資する感染症対策、栄養改善のための検査、研究機能の充実を図るため、我国に対し更なる技術協力要請越した。我国は、昭和61年4月の事前調査、同年8月の実施協議を経て、同年10月から5カ年間の予定で技術協力を開始した。

本件協力はガーナ側で研究を自助努力により継続しうるための協力を基本としてウィルス学、栄養学及び疫学の3分野に於いて協力中である。

分野毎の目標は次のとおりである。

（ウィルス学）
1. ワクチンの品質管理、保管、輸送法の検討
2. 予防接種の効果判定、効果的な接種方法の検討
3. 白血病及びAIDSの血清学的診断と血清疫学的研究
4. ウィルス感染症の診断と血清疫学

（疫　　学）
1. 他分野（ユニット）及び保健省との協同による疫学調査
2. マラリアと下痢症の確定診断と治療法の確立及び住民の健康教育
3. 疫学専門家の養成

（栄　養　学）
1. 離乳食開発
2. ビタミンA及び鉄欠乏症、他

今回の調査団の目的は、本プロジェクトが本年10月から第4年次に入るところ、現在までの協力実績・内容について調査し、今後の協力基本計画を先方と協議し、策定することであった。

また、本年は同研究所の創立10周年にあたり今回の調査団の派遣日程に合わせて日本ガーナジョイントカンファレンスが先方より計画されており、日本側として、記念講演等への参加についても目的の一つであった。

1－2　調査団の構成

団長：宍戸　亮（総　　括）　鳳川診療所所長
団員：本多憲児（臨床医学　）　本多記念東北循環器科病院院長
団員：杉浦　昭（ウィルス学）　国立予防衛生研究所麻疹ウィルス部長
団員：神谷　齊（疫　　学）　国立療養所三重病院院長
団員：岸　恭一（栄　養　学）　徳島大学医学部栄養生理学教室教授
団員：江頭栄二（協力企画　）　国際協力事業団医療協力部医療協力課

1－3　調査日程および概要

平成元年7月31日（月）21:30　成田発　KL-868
8月 1日（火）07:00　アムステルダム着
2日（水）12:05　アムステルダム発　KL-587
18:40　アクラ着
19:50　調査日程打合せ
3日（木）09:30　日本国大使館・安藤大使表敬訪問
10:30　野口記念医学研究所（以下野口研と略す）所長表敬訪問
11:00　ガーナ大学副学長 Prof. A. Sawyer表敬訪問
14:30　野口研視察および部門別協議
〔宍戸・本多〕野口研所長との協議
〔杉浦・江頭〕ウィルス学ユニットとの協議
〔神谷〕疫学ユニットとの協議
〔岸〕栄養学ユニットとの協議
4日（金）〔宍戸・本多〕
10:30　野口研10周年記念行事に関するＴＶインタビュー録画
12:00　教育省表敬訪問
15:30　保健省表敬訪問
16:00　大蔵経済企画省表敬訪問
〔杉浦・江頭〕
09:00～16:00　ウィルス学ユニットとの協議
〔神谷〕
09:00～16:00　疫学ユニットとの協議
〔岸〕
09:00～16:00　栄養学ユニットとの協議
5日（土）資料整理・JOINT SCIENTIFIC CONFERENCE 準備

6日（日）調査団・専門家による日本側打ち合せ

7日（月）GHANA-JAPAN JOINT SCIENTIFIC CONFERENCE ※日程詳細は資料1

8日（火）　〃　〃　プログラム参照

9日（水）GHANA-JAPAN JOINT SCIENTIFIC CONFERENCE

10日（木）10:00 Cooddinating Committee Meeting

11日（金）10:00 PNDC 表敬訪問（於：State House）

11:30 Notes on Discussions 署名（於：State House）

18:40 Accra発 SR-265

12日（土）06:20 Zurich 着

（神谷団員のみ）

13日（日）12:00 Zurich 発 JL-428 | 12:40 Zurich 発 SR-356

13:25 Geneva 着

14日（月）15:05 成田着 | WHO EPI 担当 Dr.Robertson との打合せ

15日（火） | WHO EPI 担当 Dr.Robertson との打合せ

Geneva発 16:25 BA-729 London着16:55

London発 19:45 JL-402

16日（水） | 成田着 15:30

1－4　主要面談者

〔ガーナ側〕

保健省

Nana Akuoku Sarpong	Secretary for Health
Dr.(Mrs.)Mary Grant	Deputy Secretary for Health

教育省

Mr.K.B. Asante	Secretary for Education
Mrs. Esi Suttaland Addy	Deputy Secretary for Higher Education

大蔵経済企画省

Dr. Kwesei Botchway	Secretary for Finance and Economic Planning
Mr.& Mrs. Amissah-Arthur	Ministry of Finance and Economic Planning

ガーナ大学

Prof. A. Sawyer	Vice Chancellor, University of Ghana
Prof. D.A. Achempong	Pro-Vice Chancellor, University of Ghana

ジョイントカンファレンスChairman

Prof. C.O. Easmon	Medical Practitioner

Dr. E. Evans-Anform	President, Ghana Academy of Arts snd Science
Dr. J.O.O. Commey	Head, Department of Child Health, Korle Bu Hospital Ghana
Dr. A.P. Bulengo	WHO representative of Ghana
Prof. Hutton A. Addy	Head, Department of Communicable Diseases, UST, School of Medicine
Dr. F. Grant	Consultant, Global 2000

野口記念医学研究所(Noguchi Memorial Institute for Medical Research) 関係者

Prof. C. Quacoopme	Advisory Board of NMIMR
Mr. M.F. Ribeiro	〃
Dr. A.A. Owusu	〃
Mr. Edwin Akpedonu	〃
Prof. M.M. Philip	〃
Prof. J.A.A. Mingle	Acting Director, NMIMR
Mr. E.K.A. Odoom	Secretary, NMIMR
Mr. Alice Lamptey	Assistant Registrar
Dr. E.A. Afari	Epidemiology Unit, NMIMR
Dr. E.E.K. Takyi	Nutrition Unit, NMIMR
Dr. N.K. Ayisi	Virology Unit, NMIMR
Dr. N.K. Ankrah	Chemical Pathology Unit, NMIMR
Dr. M.E. Aryeetey	Parasitology Unit, NMIMR
Dr. B.D. Akanmori	Immunology Unit, NMIMR
Dr. P.A. Addo	Laboratory Unit, NMIMR
Mr. M.K. Addai	Hematology Unit, NMIMR
Mr. Doddo	Electron Microscopy Unit, NMIMR
Mrs. Bulley	Library Unit, NMIMR

〔ガーナ側〕

日本大使館

安藤　茂美	特命全権大使
西村　舜治	参事官
富樫　春幸	二等書記官

JICAガーナ事務所

長倉　　孝	事務所長

三浦　敏	事務所員
池上　実	JOCV調整員
上野　則子	JOCV医療調整員

プロジェクト派遣中専門家

志塚ふじ子	リーダー・栄養学
酒徳　浩之	疫学
江口　秀夫	業務調整

2. 総括報告

団長 宍戸 亮

1. 調査の目的

本調査は、昭和61年10月から開始したガーナ国野口記念医学研究所プロジェクトが本年10月から第4年度に入るので、昭和63年度の協力実績の確認、平成元年度及び平成2年度の協力基本計画についてガーナ側と協議するのを第1の目的とした。その意味で今回の調査は巡回指導調査とした。

尚、今回調査チームは調査期間中に野口記念医学研究所（以下野口研究所）創立10年を記念して開催されるガーナ・日本合同学術集会(Ghana-Japan Joint Scientific Conference (1989年8月7日～9日）に全員が出席し、記念講演その他の協力を行なうこととした（付録参照）。

2. 巡回指導調査団の構成

調査団の構成は、団長－殿川診療所所長、順天堂大学医学部教授（客員）宍戸亮、一般総括－本多記念東北循環器科病院院長、福島県立医科大学名誉教授本多憲児、ウィルス部門担当－国立予防衛生研究所麻疹ウィルス部部長杉浦昭、疫学部門担当－国立療養所三重病院院長神谷齊、栄養部門担当－徳島大学医学部教授（栄養生理学教室）岸恭一の各専門家で構成され、更に同時期派遣短期専門家（ガーナ・日本合同学術集会参加）として京都大学ウィルス研究所免疫不全ウィルス研究施設教授速水正憲（ウィルス）及び三重大学付属病院中野貴司（疫学）が加わった。更に調査団には、一般事務担当としてJICAプロジェクト担当の江頭栄二職員（医療協力課）が加わって連絡調整を担当することとした。

3. 調査内容

(1) 野口研究所長（代行）との一般的協議

野口研究所長は前任のS.N. Afoakwa k教授の定年退職後、現在空席であり、現ガーナ大学医学部教授（微生物学）J.A. Mingle 博士がその代行(Acting)をしており、今回の調査期間中を通してMingle教授が所長としてその対応を行なった。

(2) 野口研究所各ユニットとの専門的な協議（各専門家担当）

(3) 野口研究所Coordinating Committeeにおける協議

(4) 日本人専門家チームとの協議及び打合せ

(5) ガーナ駐在安藤茂美大使との協議

(6) ガーナ大学副学長（Vice chancellor）A.Sawyer 教授並びに大学当局者との協議

(7) ガーナ国保健省関係者との連絡協議

4. 調査結果

(1) "Lancet" 問題に関連して懸案であったウィルスユニットの部長には、平成元年1月、ユニットの主任研究官(Senior Reserach Fellow)としてN.K. Ayisi博士が着任し、ユニットの部長代行として業務を遂行しており、昨年来の "Lancet" 問題は最終的に解決したことが確認された。

(2) 空席中の野口研究所所長については大学当局（副学長 A. Sawyer教授）より、その選考は最終段階に来ており、事務的な諸問題が解決すれば近く発令着任の運びになるであろうとの返事が得られた。

(3) 昭和63年度のウィルス学、疫学、及び栄養学各部門の実施計画は概ね順調に実施されていることが確認された。

(4) 各部門の日本人専門家並びに調査員は、それぞれ実施計画の指導並びに推進に充分の寄与を行なっている。特に中野リーダー（疫学）帰国後（平成元年二月30日帰国）その業務をひきついだ志塚リーダー（栄養部門）は、本プロジェクト始まって以来初の女性のリーダーであるが、酒徳専門家、立石調整員の協力の下に見事にその責務を果たしており、ガーナ側からも絶大な信頼を博していることがうかがわれたことは慶賀すべきことであった。なお立石調整員帰国（平成元年三月31日）後、本年7月新たに赴任した江口調整員も着任まだ日が浅いにもかかわらず業務の調整に充分にその力を発揮しつつあることは心強いことであった。

(5) ウィルス部門専門家は昭和63年2月以降（吉井専門家は昭和63年2月20日帰国）派遣されていないが、前述のようにLancet問題も解決されたので、野口研側の要望をも勘案して本年度以後の専門家の派遣について積極的な協議が行なわれた。同時にウィルス部門におけるAIDSウィルス(HIV) に関連するプロジェクトの積極的推進が、ガーナ側から強く要望された（ウィルス部門報告参照）。

(6) WHO が、低開発国を中心にして推進している免疫拡大計画(Expanded Programe on Immunization-EPI) の一環として、本年度初めよりWHO から野口研側にその実施を要望されていた「ポリオワクチンの効果に関する試験（野外試験）」の取扱について、ウィルス及び疫学ユニットの各関係者と日本人専門家との間に協議調整が行なわれた結果、本試験の作業は主としてウィルスユニットで担当することとし、疫学その他の関連部門でこれに協力することとした。なお、この事業に対してJICAは機材供与等では協力するが、当分の間野口研プロジェクトの実施計画とは、形の上では切り離して考えることで合意した（各個報告並びにNote on Discussion の項参照）。

5. 学術集会参加について

前述のようにガーナ・日本人合同学術集会は、平成元年8月7日～9日ガーナ大学で開催され、調査団全員及び日本人専門家は全期間中これに参加した。

野口研における学術集会としては、既に昭和60年8月8日～10日にガーナ大学とJICAとの共催にて行なわれているが(Ghana-Japan Joint Conference on Aetiology and Control of Diarrhoeal Diseases and Malnutrition)、今回は野口研創立10周年の記念事業の一つとして、ガーナ大学当局の前面的な協力により、ガーナ国政府並びにJICAの支援の下で開催されたものであった。

集会の内容は別添プログラム（添付資料参照）の通りであり、そのテーマはガーナ国における「感染症並びに栄養不良に対する診断、治療並びに予防方法、予防対策に関する諸問題」であり、発表並びに討議された演題はこれまでの野口研究所プロジェクトとして取上げられた研究課題の成果が主であり、野口研10周年記念にふさわしい集会であった。3日間の集会期間中には、野口研及びそれ以外のガーナ大学関係学部の学者並びに技術者、保健省関係職員及びガーナ大学以外の関係者（クマシ大学など）など連日 100人以上の出席者があり、参会者は延300人を越えたと思われ、且つ連日制限時間を超過する熱心な討議が続けられ、集会としては大成功であったと思われた。

なお本集会に際し本多、神谷団員は、それぞれ「癌治療の最近の進歩」「非細胞性百日咳・ジフテリヤ、破傷風混合ワクチン（APPT）の臨床試験について」の題名で、速水専門家（短期）は、「ガーナに於ける免疫不全ウィルスの分離とその血清学的パターンについて」の題名で記念講演を担当発表した。また杉浦、岸団員は集会の関係セクションで座長をついとめて討議のまとめを行ない、志塚、酒徳両日本人専門家は、それぞれプロジェクトに関連して野口研で行なわれた研究成果の一部を分担発表した。

団長の宍戸は開会に際してJICAを代表して挨拶し、野口研10周年を祝うと共にJICAのこれまでのプロジェクトの歴史を概説し、その成果が充分野口研に根付いて将来への発展に結び付き、ガーナと日本と友好のきずなになることを期待するとのべた。なお宍戸は同様の趣旨にてBulletin of Noguch Memorial Institute for Medical Research第2巻第2号（野口研10周年特集号）にEditorial を寄稿した（別添付録参照）。

Mr. Chairman (Nama Akuoko Sarping, Secretary for Health), Your Excellency Prof. Akilagkpa Sawyerr, vice-chancellor of University of Ghana, distinguished guest, ladies and gentleman, I am very proud to have the privilege of speaking at the opening ceremony of the 2nd Ghana-Japan Joint Conference here in Legon. As you know, this conference has been planned as one of the events for the ten-year anniversary of the establishment of the Noguchi Memorial Institute for Medical Research. Therefore, first of all, I should like to offer my sincere congratulations to its anniverary.

At this chance, I should like to ask all of you that you will call in mind the history of the Ghana-Japan Medical Cooperation Programme (GJMCP) as well as the history of Noguchi Institute.

As to the history of the programme, it dates back to further ten years than that of the Noguchi Institute, when professor C.O. Basman, the Dean of the University of Ghana Medical School at that time, approached the Embassy of Japan in Accra to seek the cooperation of the government of Japan in the development of medical research in medical school.

After laborious negotiations between the authorities of two countries, Japan and Ghana, the programme was finally established as a scheme of collaboration research between the Fukushima Medical College and the Ghana Medical School under the auspices of the Japan International Cooperation Agency (JICA). In Japanese side, Prof. Kenji Honda, of Fukushima Medical College played an important role to determine the final agreement between two countries for the programme.

The programme had started in 1969 and had continued for about ten years under the successive three projects, until the time of the establishment of the institute.

At the termination of the third project of the programme, the government of Japan decide to construct a building and donate it Ghana as a medical center in memory of Dr. Hideyo Noguchi, a renowned Japanese medical scientist. Dr. Noguchi was born in 1876 at Fukushima prefecture in Japna, learned microbiology at the Institute for Infectious Disease of Tokyo University, went over to United States of America, and was successful in many research works on microbiology and immunology at the Rockefeller Institute there, Unfortunately, he died at at Accra in 1928 while working on the problem of yellow fever as the leader of study team sent by the International Health Boad of the Rockefeller Foundation.

In fact, the construction of the institute started in 1977 and the building was completed and commenced in November 1979 under the name of the Noguchi Memorial In-

stitute for Medical Research.

Since the Institute commenced, the project of GJMCP has been undertaken by the Institute in stead of the departments of the University of Ghana Medical School.

At the same time, the terms of the agreement that established renewed GJMCP required the Government of Japan to dispatch Japanese medical scientist and technician to Ghana to work with their Ghanaian counterparts on agreed research project, and also to provide training and observation facilities in Japan for Ghanaian medical personnel. It also required the Government of Republic of Ghana to undertake to nominate Ghanaian counterparts to the Japanese medical scientists and technicians. Consequently, according to the agreement, many medical scientists and technician have been dispatched to the Institute by JICA form various medical institutions including the National Institute of Health of Japan and departments of medical school of several universities in Japan. And also not a few Ghanaian medical personnel had chance to visit the medical institutions in Japan for training and learning on the concerned field of medicine.

As you know, the first five-year project of GJMCP for the institute started in 1980, and the fruits borne from research of the project had already read by the scientists of the institute on the first Ghana-Japan Joint Conference which was held here in August 1985.

I first visited Noguchi Institute in 1984 as the leader of the evaluation team which was dispatched by JICA. Thereafter, I have been closely associated with the Institute, because I have been nominated as the chairman of Internal Advisory Committee on the Noguchi Memorial Institute Project in JICA. In 1985, as the result of the evaluation of the project by our team, I recommended a clearer definition of the Institute's mandate at first. Because, at that time, on the one hand I understanded the primary request of Prof. O. B. Nasman for GJMCP and agreed the initial and far-reaching objectives of the establishment of the Institute along this line, but on the other hand, I recognized the necessity that the Institute, for the time being, should be concentrate its activity to achieve immediate impact on the health and welfare fo the people in this country.

Along this line, our final recommendation at that time is that the Institute should carry out research on priority health problems in support of the programme for the control of the communicable diseases and malnutrition.

It was my great pleasure that the Advisory Board and the Management Committee of the Institute accepted our recommendation at that time.

In 1986, a five-year project for Noguchi Memorial Institute supported by JICA started in the Institue. The project include three subjects, they are epidemiology, virology and nutrition. It was expected that the activities of the Institute would be directly useful to the promotion of health and welfare of the people of Ghana through performing these three subjects of the project. Today I expect that several fruit from the projects will be reported here in this conference as it was done at the last conference held in 1985. And also I sincerely hope that a great deal of effects and contributions will materialize through the performance of the projects, not only to the promotion of the level of medical science of Ghana, but also on improvment of mutual understanding and friendship between the people of two countries, Japan and Ghana, and also I sincerely hope that such effects done by the programme will take root deeply in the ground of Ghana and continue to grow up to bear many brilliant fruits in future.

Prof. A. Shishido
Head of JICA delegation
to Ghana

EDITORIAL

The historical review of the Ghana-Japan Medical Cooperation Programme and the Noguchi Memorial Institute for Medical Research

The Noguchi Momorial Institute for Medical Research (NMIMR) was established as an autonomous Institute of the University of Ghana in November 1979. This year marks the tenth anniversary of its establishment. I congratulate the Institute and call on the entire staff to always bear in mind the history of the Ghana-Japan Medical Co-operation Programme (GJMCP) as well as that of NMIMR. The history of the GJMCP dates back to 1969, when Professor C.O. Gasmon, dean of the University of Ghana Medical School, approached the embassy of Japan in Accra to seek the assistance of the government of Japan to develop medical research in the medical school. After laborious negotiations between Japan and Ghana, the GJMCP was finally established as a scheme of collaboratory research between the Fukushima Medical College and the Ghana Medical school under the auspices of the Japan International Cooperation Agency (JICA).

The programme which started in 1969, 10 years before the establishment of the institute, involved two to three-year projects. The first project was "Virology and Electron Microscopy ", and was based in the Departement of Microbiology of the University of Ghana Medical School. The second project on "Viral and Other Parasitic Diseases of the Eye" involved the Department of Ophthalmology, and the third project on "Pathophysiology and Immunology of Tropical Diseases in Ghana" provided technical support for the Departments of Pysiology, Pathology and Medicine. It was during the third project that the Government of Japan decided to construct a building and donate it to Ghana as a medical center in memory of Dr. Hideyo Noguchi, a renowned Japanese medical scientist. He was born at Fukushima prefecture in Japan, studied microbiology in the National Institute for Infectious Diseases at Tokyo. He later went to the Rockefeller Institute, U.S.A., where a lot of his research work in microbiology was done. Unfortunately, he died in Accra in 1982 while working on the problem of yellow fever as the leader of a study team dispatched by the Rockefeller Insdtitute.

The construction of the Institute started in 1977 and the building was completed and commissioned in November 1979 and named the Noguchi Memorial Institute for Medical Research. Since the institute was commissioned, the project of GJMCP has been taken up

by the Institute instead of the various departments of the University of Ghana Medical School. At the same time, the terms of the agreement that established the new GJMCP required the Government of Japan to dispatch Japanese medical scientists and technicians to Ghana to work with their Ghanaian counterparts on agreed research projects and also to provide training and observation facilities in Japan for Ghanaian medical personnel. It also required the Government of the Republic of Ghana to undertake to nominate Ghanaian counterparts to the Japanese medical scientists and technicians. Consequently, according to the agreement, many medical scientists and technicians have been dispatched to the Institute by JICA from various medical institutions including the National Institute of Health in Japan and departments of medical schools of several universities in Japan. Also many Ghanaian medical personnel have had the chance to visit medical institutions in Japan for training and learning in relevant fields of medicine.

The first five-year project of GJMCP for the institute on "Aetiology and Control of Diarrhoeal Diseases and Malnutrititon", started in 1980. Some of the research results from the project were read by the scinetists of the Institute at the first Ghana-Japan Joint Conference which was held in Accra under the auspices of the Institute in August 1985.

I first visited NMIMR in 1984 as the leader of the Evaluation Team which was dispatched by JICA to evaluate the performance of the first project undertaken by the Institute, 1980 to March 1985. Thereafter, I have been closely associated with the Institue, having been nominated as the Chairman of the Internal Advisory Comittee of the Noguchi Memorial Institute Project at JICA. In 1985, as a result of the evaluation of the project by the team, I recommended a clearer defintion of the Institute's mandate in answer to the proposal for another five-year project succeeding the first. This was because on one hand, I understood the primary request of Prof. C.O. Easmon for a GJMCP and agreed with the initial and far-reaching objectives of the establishment of the Institute along this line. Also on the other hand, I recognised the necessity for the Institute to concentrate its activity on achieving immediate impact on the health and general welfare of the people in greatest need in the country. Along this line, our recommendation was that the Institute should carry out research on priority health problems in support of the programme for the control of communicable diseases and malnutrition.

In this connection, we also recommended that the Institute, being under the

University of Ghana, should cooperate with the appropriate authorities of the Ministry of Health of Ghana in research work on the above-mentioned problems. At that time I expressed personally, my thought that the Institute should have such characteristics as the National Institute for Medical Research in U.K. or the National Institlute of Health in U.S.A. At the same time I also introduced the history of the foundation of the National Institute of Health of Japan, which is now 40 years old. Its establishment was due to the national necessity to have a central institute which carries out researches contributing to national health and welfare. On its establishment in 1947 urgent problems were control of epidemic and endemic diseases and restoration of good sanitary conditions. The activities of the Institute, therefor, have primarity been concentrated on communicable diseases including their etiology, immunology, epidemiology, prophylaxis and therapy, and on assay of biological products and antibiotics. About 10 years its foundaion, the Institute (NIH) devoted itself to its original purpose of fundamental medical research.

It was my great pleasure that the Advisory Board and the Management Committee of the NMIMR accepted our recommendation at that time and decide that, until the resoruces of Ghana can support further expansion and diversification of its activities, the Institute should carry out sustained research into priority problems related to the etilolgy, pathogenesis, therapy and prophylaxis of communicable diseases and malnutrition in Ghana.

In 1986, a five-year project for Noguchi Memorial Institute supported by JICA started in the Institute. The project comprised three subjects, epidemiology, virology and nutrition. It was expected that the activities of the Institute would be directly useful to the promotion of health and welfare of the people of Ghana through performing these three subjects of the project supported by GJMCP.

I have described a short historical review of the GJMCP and NMIMR. As stated here, about twenty years have passed since such cooperation programme between the two countries of Ghana and Japan started. It is my great pleasure to conclude that a great deal has been achieved not only in raising the level of medical science in Ghana, but also in improving mutual understanding and friendship between the people of the two countries. I sincerely hope that these achievements will take roots deeply in Ghana and continue to grow to bear many brilliant fruits in the future.

Akira SHISHIDO
Professor, Department of Microbiology
School of Medicine, Juntendo University,
Tokyo, Japan.
Ex-direcdtor general, the National Institute
of Health of Japan.

3. プロジェクトの実績

3－1 専門家の派遣

昭和46年度協力実績は別表の通りであり、ウィルス学については、Lancet問題もあり、派遣を見合せていたが、解決も見極められたので、今後、専門家の派遣についても検討を進めることとなった。また元年度実施計画についても別表のとおり、作案し、実施されている。

3－2 研修員受け入れ

本プロジェクトのカウンターパートは、毎年3名を受け入れており、これについても別表のとおりの実績である。

3－3 機材供与

本件は、プロジェクトの進捗に合わせて順調に供与されている。今後の課題としては、試薬類の供与については有効期限の問題もあり、可能であれば、現地調達方式によることが検討されるものである。

なお63年度供与機材は医研究機材、消耗品及び試薬を中心に、約3400万円分を送付した。

ガーナ国野口記念医学研究所プロジェクト

項　目	項　目　2	62年度以前	4　5　6　7　8　9	10　11　12　1　2　3	
専門家の派遣			中野		
	リーダー（兼　疫学）	62/2/21			63/2/20
	調整員	61/10/6	立石		
			古庄		63/3/31
	栄養学	62/9/21		63/9/30	
	〃		重 62/3/13←→4/2	志塚（現チームリーダ）	
				63/10/17←	
	疫学			酒徳	1/10/16
	ウィルス学			1/2/21 ←	
					2/2/20
調査団等			専門家チーム 63/8/7 ←→8/15		
機材供与	23.000千円（62年度分）		x現地着		
				仕様作成	
	30.000千円			x　x　x　x　x	
				実施計画　購送請求　契約　納品・輸送　現地着	
カウンターパート	疫　学			John Fenteng 1/1/30 ←	
				（三重大・日本総合愛育研究所・琉球大）	1/12/3
	栄養学			Juliana Yartey 63/11/13 ←	
				（琉球大）	1/11/11
	ウィルス学			William K. Ampofo 1/3/12 ←	
				（長崎大熱帯医研）	2/3/10
（4）	医療機器保守			Lawrence A. Acheampong 1/3/12←	
					1/10/10

ガーナ国野口記念医学研究所プロジェクト

平成元年実施計画

項　目	項　目　2	63年度以前	4　5　6　7　8　9	10　11　12　1　2　3	
専門家の派遣	リーダー	中野 62/2/21 ——→1/2/20			
	調整員	立石 61/10/6 ——→1/3/31	江口 1/6/14←……	……→3/9/30	
	疫学	1/1/21 ……	酒徳	(1/10/16よりリーダー) ……→3/1/20	
	栄養学	63/10/7 ……	中野 1/7/31←→8/16 志塚(1/2/21 よりリーダー) ……→10/16		
	ウィルス学		速水 1/8/3←→8/14		
	その他		2W ⇦⇨ 機材修理調査		
調査団			巡回指導 1/7/3 ←→8/14	機材修理 ⇦⇨	
供与機材	A4フォーム接到		仕様ツメ x——x 実施計画	x——x——x——x 契約　納品　輸野口研着 送	
カウンターパート受け入れ 3名		Mr. E. K. A. Odoom 1/5/15 ←→6/14 野口研事務長 Dr. E. A. Afari 1/5/15 ←→6/14 野口研疫学ユニットヘッド Dr. E. E. K. Takyi 1/5/15 ←→6/23 野口研栄養学ユニットヘッド			

4. 分野別報告

4－1 ウィルス学

杉浦　昭

8月3日～11日のアクラ滞在期間中にウィルスユニット研究員との会議、疫学ユニット・ウィルスユニットの合同会議、野口研10周年記念日本・ガーナ合同研究会、およびウィルスユニット研究員との個別的会談を通じて把握し得たウィルスユニットにおける研究の現状は以下の如くである。

1. 人事関連事項

1）現在の人員構成

Acting Unit Head : Dr. N.K. Ayisi

Research Fellow : Dr.M.Osei-Kwasi

Senior Research Assistant : J.A.A.Brandful

Senior Research Assistant : W.K.Ampofo

Technician : T.B.Kwofie

Technician : A.P.K.Magnusen

Technician : J.S.Barnor

上記職員に加えNational ServiceからS.K.Amfo及びM.Aidoo が本ユニットの研究に参加している。

前Unit Head 、現Acting Director のMingle教授も事実上のウィルスユニットと一員としてAIDS研究を行なっており、またユニット内容の会議にも常に出席している。

2）過去1ケ年の人事

Dr.Ayisiが1989年1月に着任した。同氏は米国Alabma 州の獣医学校を卒業して獣医師の資格を取得。CanadaのUniversity of Saskatchewan及びUniversity of British Columbiaにおいてヘルペスウィルス、主として抗ヘルペスウィルス化学療法剤に関する研究を行なった。約1年間のNigaria における教職の後当野口研に来た。同氏の研究経験は必ずしも豊富ではなく、研究の興味および視野も狭きに失する傾向がある。しかし当ユニットにあっては稀に見る誠実な性格の持ち主であり職務に対する責任感を有しかつ研究にも熱心であると見受けられるので今後の成長は期待されるものと思われる。

Mr.Brandful は1年間の研修を終えて1989年4月帰任した。

Mr.Ampofo は1989年2月より研修のため在日中である。

2. 研究活動

第5次計画におけるウィルスユニットの課題は

1）主要ウィルス疾患の実験室的診断

2）予防接種計画への協力

3）ウィルス疾患の疫学的研究のための他のユニットとの協力

である。以下に過去1ケ年間の課題毎の進捗状況を要約する。

1）実験室的診断およびそれに関連する研究

ヒト免疫不全症(AIDS)ウィルス(HIV) 感染症は現在当地における最も重大な脅威の一つである。当野口研は保健省の要請に基づき血清学的診断の確認センターとなっている。すなわちガーナ国各地における検査あるいはscreening において陽性と判定された、あるいは陽性が疑われた血清検体はすべて当研究所に送付され、当ウィルスユニットにおいて、Western blottingおよび免疫蛍光法による確認が行なわれることになっている。

輸血前のscreening には特に簡便かつ迅速な検査法が要求される。米国Family Health International/USAID との協力の下に三種類の迅速診断用キット、すなわちHIV Check(Du Pont) 、Retrocell(Abbott) およびSerodia(Fujirebio)の評価を行った。綜合的に評価して三者間に有意な差は認められなかった。

2）予防接種に関連する研究

（a）ポリオ

Accra 地区およびガーナ東部農村地帯においていろいろなポリオワクチン投与方式を試み免疫効果の比較を行なった。出生直後から通常の2倍量のワクチンの投与を行なえば充分な免疫が得られるという成績であった。現在WHO によって採用されている4回投与方式は当地農村においては実施困難であるが、上記2回投与ならば実行可能である。この方法により充分な免疫が得られるならばポリオの予防は著しく容易になろう。

（b）麻疹

当野口研疫学ユニットと協同してガーナ中部地区の農漁村および農村において7ケ月令乳児における麻疹ワクチン投与を試みた。血清抗体陽転率は81% でありまずまず満足すべき効果であった。WHO の推奨する9ケ月令より前に接種を行なっても麻疹ワクチンはかなり有効であることが確認された。

（c）諸種ワクチンの力価試験

予防接種実施のいろいろな時点においてポリオワクチン、麻疹ワクチンおよび黄熱ワクチンの力価試験を実施しワクチンの保存および取り扱いが適切であるか否かの検討を行なっている。

また保健省およびUNICEFの要請に応じて上記ワクチンの力価試験を行なっている。

3）ウィルス疾患の疫学的研究

（a）出血性結膜炎

1987年Accra における出血性結膜炎の流行から多数のCoxsackievirus A24が分離されたことは既に昨年度報告書に述べられているが、昨年度Brandfulの本部研修中にこれら分離株の一部のT_1オリゴヌクレオチドマッピングによる遺伝学的解析が行われウィルス進化の道程の一部の推定が行なわれた。

（b）風疹

昨年度報告されている風疹の血清疫学的研究の継続としてAccra 在住の成人女子（妊婦および女子大生）の血清風疹抗体検査が行なわれた。前者の91% が抗体を保有していた。妊娠可能年齢女子の間に少なからず風疹抗体非保有者すなわち風疹感受性と思われる者がいることは警戒を要する。

（c）ロタウィルス

疫学ユニットと協力して中部沿岸地区Gomoa-FetlehおよびGomoa-Onyadze において小児の糞便検体中のロタウィルス抗原の検出を行ない小児下痢疾患中のロタウィルス感染の頻度を推定した。

3. WHO との連携および協力

WHO は疫学拡大計画を推進するためにポリオワクチンの投与方式の評価を行なっているが、当野口研に対して協力の要請があった。

同様な目的の研究は既に当ウィルスユニットの独自の研究として行なわれて来ているので（前述）、この要請に応じて研究を拡大することになった。すなわち、疫学ユニットとの協同プロジェクトとするとともに対象地区を拡大することになった。

当ウィルスユニットは現在以下の二つのWHO 地域センターの候補に挙げられている。すなわち、①AIDS確認検査センターおよびポリオ根絶計画のための実験室的支援センター、および、②アフリカ地域の免疫拡大計画のための教育訓練センターである。

当ユニットがこれらの役割を果たしうるか否かを評価するためのWHO より二つのチームが野口研を視察するために派遣された。

4－2 疫 学

神谷 齊

はじめに

私はJICAガーナ野口研プロジェクトAdvisory Missionの疫学部門担当専門家として1989年7月31日～8月16日までガーナ国アクラ市へ出張した。アクラ市には8月2日～11日まで滞在し

疫学ユニットを視察し研究内容につき意見交換した。またこの期間中、8月7日～9日までは野口研で開催された Ghana-Japan Joint Scientific Conferenceに出席し、第2日午後には "Clinical Trials with the Japanese Acelluler Pertussis-Diphteria-Tetanus(APDT) Vaccine"と題して講演を行なった。また帰途ジュネーブの EPIのHQへDr. S. Robertsonを訪ね、ガーナ野口研における EPIのプランによる Polioワクチンの投与と効果に関する研究について討議した。今回の私のガーナ国訪問は1983年夏以来3年ぶりであったが、アクラ市内の変化に大変驚いた。空港はよく整備され、人々の服装もこぎれいになり、日常必需品は街にあふれ、市内を走る自動車も新車が目についた。また今回宿泊したホテルShangri-laもアフリカ的でなかなか良かったが、市内にできたノボテルはホテルニューオオタニに近いものであり、これがガーナ国にできるようになったのかと大変びっくりした。

また野口研は本年10周年ということでガーナ政府が予算をつけ、全面塗替え、野口研へ通じる道路整備（舗装も含めて）等が完成し、街灯が立ち並んだ様子は大変立派であった。また一方かなり無理をしている面もあるようで、いろいろ他にこのしわ寄せがあるらしいこともうかがわれた。しかし私の友人の一人であるDr. Binkaの話では最近公共施設や病院の整備が少しずつ手がつけられてきており、コレブの大学病院も含めてもっと良くなると思うとのことであった。内容的な整備にはまだ十分手が届かないにしても、この様な所に目が向けられてきていることはガーナ国の政治、経済上の安定が得られていることを物語るものとの印象を得た。

また日本から派遣されている専門家の先生方のお話でも食料品、衣類等は充分手にはいる状況にあるとのことであったが、一方ではインフレーションが進み、1 $ = 260セディ（公定）となっており、ホテルでも1 $ =330 ～ 350セディで交換している状況であり、物価の上昇がめだった。

疫学ユニットの活動

今回の unit との話し合いは、8月4日及び5日を中心に実施した。4日は unit の全体会議を持った。参加者はunit head のDr. Afari、日本人専門家、酒徳医師、Mrs. Assoku(nurse) 、Mrs. E. Kwarteng(nurse) 、Mr. George(technician, computer) 、Mr. Wiliams(National service)、Mr. Augustin(National service)の7名であった。Unit head としてDr. Afari が着任されて3年になるが、途中WHO の仕事で半年間留守にしていたので実質的には2年半である。しかし日本人専門家とカウンターパートの間は大変うまいっており、別添のunit report 1988/89 に見られるごとく、1986～1991年までの事業計画に添って対象とするフィールドを Gomoa Fetteh、Gomoa onyadze/Otsew Jukwa の2カ所3つの村からGomoa Mprumen を加えた4つの村にサーベイ区域を拡大した。また2年ごとにセンサスを行ない、これらの村での対象人口をしっかりつかむ努力がなされている。またこのフィールドでの5大主要疾患サーベイランス、Measles, Polio, DPT, T.T. などのワクチン接種、マラリアのコントロール、クロロキン

耐性マラリアの実態調査など地についた活動がいろいろ行なわれている。この様に今や疫学unitは野口研に於ける活発な活動を実施しているunitになっている。

またImmunology, Bacteriology, Virology, Haematologly, Parasitologyなどの他のunitとの共同作業もうまく行なわれており、Dr. Afari の人柄の良さと強調性がうかがわれる。

またフィールド活動では保健省、ガーナ大学医学部疫学、熱帯医学臨床薬学治療センター(CTCPT) 等ともフィールド活動、マラリアの疫学研究を通じて人的、技術的交流を行なっており、これはDr. Grant 以来開始されたモデル地区活動をガーナ全体の活動へ拡大してゆくステップとして、またunitの活性化のためにも大変良いことであろう。

一方まだ人材は十分ではないが、チームワークはよくとれており評価し得る。しかし仕事内容からみて、現地の医師の補充は必要と思われた。Dr. Binkaの後任者が近々保健省により派遣されるという話は以前からでているが、約半年を経過してもまだ実現していない。この点についてはDr. Afariも努力中といっているのでもう少し待つよりしかたなかろう。しかし今後EPIとの協力によるポリオワクチンの投与方法及び投与量の研究を開始するとなると、どうしてもマンパワーは不足するので、今回もガーナ側に強力に現地人医師の補充につき要請を行なった。また日本人専門家の酒徳医師の仕事量も週2回のフィールドワークとクロロキン耐性マラリアの研究で手一杯であり、ポリオワクチンの研究を実施するとなるともう一名、ポリオのフィールドへ参画できる日本人専門家の応援が必要であると思われた。

フィールド活動について

Unitのannual report (別添)に詳しく記載されているので、ここでは概略を述べるが、4つの村での総人口は 4,293名で、男性 1,911名、女性 2,382名である。文盲者は全体の57.7%と報告されている。死亡率は 1,000人あたり 12.81、出生率は 1,000人あたり 47.52、乳児死亡率は、 1,000人の出産児中 19.61となっている。しかし人口増加率は、 1,000人あたり34.7 (3.5%)と極めて高い。フィールド活動により、小児の死亡率は減少しているものの、人口増加の問題が出てきており、家族計画指導が早急に必要と思われた。疾患としては昨年に比し下痢は減少してきているが、マラリアの発生率に変化は認められなかった。

健康教育にビデオを使用しているが、現在の機械(VHS-pal方式) がユニセフのフィルムなどを使用できないので困っているとのことであった。江口氏 (調整員) に問い合わせたところすでに今年度予算で買入予定となっているとのことであったのでその旨伝えた。この他データ整理用のパソコンも要求がずっと出ており、今年度で処理していただける予定とのことであった。

フィールドの治療活動は現在、Onyadze/Otsew clinicが毎週Gomoa Petteh, Gomoa Mprumenが隔週となっている。ここで必要な薬剤の管理についてはまだJICAからのサポートのため日本人専門家が行なっているが、今後独立のことを考えるとそろそろガーナ側で管理出来るようにしていく必要があると思われた。この点については酒徳専門家及びDr. Afariに指導をしておい

た。

研究活動は従来から続けているOnyadze/Otesw Jukwa での乳幼児期の急性下痢症の病院に関する研究、全フィールドでの乳幼児期の発達、栄養状態に関する研究の成果が実ってきており、これらの資料はフィールドの教育・指導に役立っている（資料参照）。また最近ではImmunology unit 、保健省、CTCPT 、ガーナ大学との共同研究としてフィールド活動を通じてのマラリア感染の実態調査（特に初感染年齢など）、クロロキン耐性P. falciparumのガーナ国全域における実態調査を開始しており、現在までのフィールド活動ではin vivo で19.4%のクロロキン耐性 P. falciparum が発見されている（資料表11-14)。

また本年3月には共同研究グループ主催、保健省、JICA、WHO 及び DANAPCOの後援で Malaria in Ghanaと題してセミナーが開催された。この成果については Ghana Medical Journal に発表されることになっている。

この他のウィルスunitとの共同研究として麻疹、ポリオ、破傷風などのワクチン接種及びその抗体上昇率の調査も継続しており、特に本年は麻疹の接種年齢を9ケ月から7ケ月までさげてもほぼ同様の抗体上昇率であることが証明されており、WHO からも注目されている。

本年の成果は、すでに3編が論文として出版され3編が in press である。このことは従来からみると advanceであるが、今後はガーナ国内誌のみならず international levelへ投稿してゆくように希望した。

今後の研究の動向

1）従来の研究はこのまま継続される。

2）クロロキン耐性マラリアの研究は、その発生要因、伝播経路、対策などを立てる必要があるため、来年にかけてガーナ国の北部及び西部の実態調査を追加し、現在得られているアクラ付近、ガーナ国東部の成績と合わせて多角的に検討する。

3）ワクチンの分野では新しく EPI要請によるポリオ2回接種法による efficacy の研究がウィルスユニットと協同して開始される予定である（この件に関しては追補参照）。

4）ポリオワクチン投与と平行して日本で開発された APDT (acelluler pertussis diphtheria tetanus) vaccineの熱帯地域の効果の研究がImmunology unit における Dr. Akanmoriとの共同研究で開始されることになっている。この研究は現在の Epidemiology unit の野外活動フィールドで出産する新生児に関して WHOのワクチンプログラムにそって実施する予定である。また抗体価の測定は Immunology unit ELISA 法を用いて実施する。測定方法の指導、抗原の準備、ワクチンの提供などを要請されている。この件についてはすでに三重大学グループとして経験が豊かであるので以下のように実施する予定である。

①ELISA 法については現在訪日中の John Fenting にマスターさせる（1989年12月～1990年2月の間の三重病院の研修期間中）。

②測定用抗原、ワクチンについては阪大微研の協力を得て提供していただく（すでに深井理事長の快諾を得ている）。

③フィールドとしては、Onyadze/Otsew Jukwa ほか４つの村を予定している。

④従来のユニセフワクチンをコントロールとして実施する。

⑤具体的な計画については EPIの指導、協力が得られる。

カウンターパートの受け入れ、日本人専門家派遣について

カウンターパートは現在 John Fenting が来ているが、Dr.Afariとしてはこのプロジェクト全体を見てみると、今迄 epidemiology unitからの派遣者が少なく、unit間に不公平があるのでぜひ本年も続けて Epidemiology unitから派遣することを希望している。この点はガーナ側での調整を依頼しておいた。

日本人専門家、酒徳博士があと１年間継続して派遣されるが、先にも述べたポリオワクチンの EPI依頼による研究を成功させるためには、もう１名応援を必要としている。以前より大阪医大小児科西村助教授を通じて本プロジェクトへ参加希望のあった三村嘉寿男医師に希望を問い合わせたところ、本年11月以後であれば参加したいということである。

まとめ

以上述べた如く野口研に対する期待はガーナ国内外で高まっており、 JICA を通じての日本の援助が長年の努力によって成果が上がってきている。ガーナ国単独ではまだまだ経済的に力不足であり、今後も強力な援助を必要とするものと思われる。西アフリカで有数の研究機関として WHOからも注目されており、プロジェクトの期間的長さのみで今後の方向が協議されることのないよう希望する。

なお、 EPI訪問については以下に別添として付記した。

追　補

ＥＰＩ　ＨＱ訪問に関する報告

神谷　　齊

８月15日（火）午前９時　ジュネーブ ILOビルディング11階にあるDr. Susan E. Robertsonを訪問した。彼女は、11階エレベータを降りたところで出迎えてくれた。本日の私の訪問に備えて WHOの Biologicals unitのDr. Judie Milstien も呼んでくれてあり一緒に話をした。またこれに先立ち、私の EPI訪問は生まれてはじめてと知り、早速 EPI head のDr. Henderson に紹介を

してくれた。

ガーナ野口研に関しては EPI として大変興味と関心を持っておられ、全体の仕事の内容、Dr. Mingleの近況、unit同志の人間関係等につきなごやかな話し合いをした。

今回の野口研10周年の Ghana-Japan Joint Scientific Conferenceにいては大変興味を持たれ、私の持参したプログラム、抄録をコピーされた。また野口研各unitの報告書（annual report 的である）も持っていたので、全体の様子を知らせるために渡してきた。またDr. Sakatokuの7ケ月児に対する麻疹ワクチン接種報告（draft copy）にいては大変興味を持ち、参考にしたいとのことであった。いろいろ話して11時20分にバス停まで送っていただき別れて来た。今回の討議の要点を以下にまとめる。

A. Polioに関して

1. JICA小早川課長をはじめ、我々のガーナでの努力に対して大変感謝している。
2. Epidemiologyと Virology の両unitが合同して、Dr.Mingle の指導の元に仕事が進められるように努力してくれ、我々に対して感謝する。
3. EPIとしてはできればサンプルサイズを大きくして、1,000 ～1,200 人ぐらいでやりたい。不可能ならば 400人ぐらいの小サイズでも良いが、なるべく前者を希望する。
4. 何れにしろこの仕事を効果的に進めるためと野口研のウィルスラボの実力を知るためにも、現在の予定では来年1月にDr. Robertson と Virology の責任者Dr. Milstienがガーナに行く（人は変わるかも知れない）。
5. 野口研から、オランダの RIVM 研究所を使って行なう Polio laboratory course に key person（例えば、Dr. Mingle または Dr. Osei-Kwasi ）等を送って欲しい。これによって Polio に関する laboratory method を standerlizeしたい。

これに関しては JICA から派遣費が出せるかどうかについては、検討の余地は残っていることを話した。又野口研との contact について、手紙は直接 Mingle 所長へ出すように依頼した。Dr.Sakatoku 又は Dr. Osei-Kwasi へ直接出されると、話が混乱する心配があることを話し、彼女は了解した。

6. もし野口研からオランダへ人が派遣できた場合には、帰途ジュネーブに立ち寄ってもらい、具体案等について話し合いたいとのことであった。これについては、野口研から派遣される人が最終決定されてから、検討することにした。

なお、オランダのポリオトレーニングコースは本年11月20日～30日の間に実施される。

7. ガーナのサンプルサイズを1,000 ～1,200 とすると、これにかかる予算は＄40,000～＄50,000／年ぐらいは必要であろう。
8. 野口研のラボのチェックも必要なので、一度検体を送って結果を提出させ、ラボの能力をチェックしてみるのも良いと思う（Dr. Milstien）。

9. ガーナでの抗体測定結果を standerlize するため、検体と各患者より 0.2 ml とり、半分を Atlantaの CDCへ送って quality controlのためのチェックをしたい。

現在、10カ所でこのような Polio trialが計画されており、今迄実施した4カ所はそれぞれのラボのみでやっているが、結果を見ると qualityが今一つである。又ソ連でも同様のstudyを proposeしているところであり、血清は半分米国へ送らせるように計画中であるが、まだ決定していない。

これに関して私から予研へ送ってはどうしていけないかとたずねたところ、予研のラボでもquality controlのため CDCとデータ上の比較と検討評価が必要であるとのことであった。また PolioのIgMも測定したいので、予研から研究者を送って指導して欲しいとのことであったが、これに関しては私はお答えできないので帰って相談すると話しておいた。（予研の実力を十分承知していないらしい）

10. もし 1,200名サイズでなんとかできるならば、多面的に手伝いたいし、ワクチンを提供するスポンサーもすでに用意されているようであった。この研究は2年間かかるが、 JICA は金を出してくれるかと聞いていた。1年間は約束されているがその後については私は答えられないと話しておいた。

11. 以上の discussion をふまえた上で、私としては Dr. Aritaが中心になって笹川ホールで10月10日～20日までの間に、3つの closed meeting があり、これに Dr. Robertsonも Dr. Milstien も出席のため来日するということになったので、この時に少なくとも JICA （小早川先生他）、予研山崎先生と神谷と一緒にさらに具体案を討論することにした。この時予研のラボもぜひ見たいとのことであった。

10月9日（月）3：30 又は11日（水）は一日空いているとのことであるので、meeting と予研見学をアレンジする約束をした。 JICA 国内委員会が、9月6日に開かれるので、一応この会議で決定の上、FAX で9月7日に返事をする約束をした（彼女達は期間中、都インへ宿泊予定）。

12. なお本日の野口研を使ってウィルス疫学両ユニットの協力のもとに、さきに提案されたようなポリオスタディをすることを決めたいということと、一度 EPIの人がガーナを訪問したいということを Mingle 所長宛手紙を出して良いかということであったので、O.K.と返事をした（このコピーは日本へも送付されます）。

その他について

① Dr. Sakatokuのやっている7ケ月接種については大変興味がある。しかしすでに6ケ月でも接種効果が良いという studyが他でもできている。

この様な研究をやるときには、ぜひ EPIへも知らせてくれれば mothodologyにつきもっとdiscussionできる。designを変えることもできるので協力したい。

② APDTの仕事にも大変興味がある。BPI は過去6年間 DPTには silent であったが、APDT には興味を持っている。日本での publishmentがほとんど日本語であるので少し残念だ。しかしもっと話も聞きたいし、他の関係者も紹介するので、ガーナでやるならぜひまた BPIへ相談に来て欲しいとのことであった。

以 上

Comments to Epidemiology unit

Hitoshi Kamiya

As you can see in the Epidemiology unit report, the Epidemiology unit is doing a lot of work under the program implementation schedule of the NMIMR. I think, the unit became one of the active units in this institute.

The epidemiology unit has much collaboration not only in this institute but also to the Ministry of Health, University of Ghana Medical School in the training of Community Health Specialist/Epidemiologist and the Center for Tropical Clinical Pharmacology and Therapeutics (CTCPT). This is very important communication to expand the units activities. I think, the unit is going on the exact way.

According to the expansion of the research work, the survey area has been extended from Gomoa Fetteh and Goma Onyadge/Otesw Jukwa to Gomoa Mprumen in the Gomoa district of the central region. And the research area of Malaria is expanding from the schools at Nima and Madina, four villages which I mentioned above, to the north and west area of this country. During this year Dr. Binka moved to the another project, and Mr.J.Fenting went to Japan as a member of counterpart training. This unit has 6 members except Japanese counter part Dr. Sakatoku, nevertheless they are facing to the shortage of manpower. I think this unit is necessary to have at least one Ghanian doctor instead of Dr.Binka. And also one Japanese Doctor is nessesary for the work of Polio vaccination program.

Census of the village has been conducted for two years.

Last year was a census year. This result shows that the natural rate of population increases 34.7 per 1,000 population or 3.5%. The rate of population was growing very much. Although this result is related to your effort against primary health care activities, family planning activities in the communities which should be intensify.

I agree your opinions that it is too early to assess the effect of the malaria and diarrhoeal diseases control. However the data which concerning diarrhoea have some ununderstandable part. If you look at the causative agent of diarrhoea in parasite study, you have 65.8% negatives in bacterial study, you have 58.7% negatives in viral study, you also have 90.3% negatives. How do you diagnose these children who have diarrhoea? I think we have to find out the way how to survey those.

Within our discussion with unit members, some health education materials which you want to use in the village and the computer to summarize epidemiological data were pointed out. Japanese counterpart, Dr.Sakatoku mentioned that these machines are already listed up this year's provision of equipment. I think you will have them within this fiscal year.

The Malaria research is the most important point in this country. From the surveillance of major causes of childhood morbidity, Malaria always has the top position in each village. Your survey against the sensitivity status of Plasmodium Polcipamm to chloroquine in Gahna and the research of chroroquine resistans are very important. The seminar on Malaria in Gahna was held in March 1989 which is organized by the Epidemiology

unit, Immunology unit and CTCPT. This meeting will show big influence to the future research against malaria. This seminar is one of the evaluable happenings in this year. Please make big effort to continue this work and if you can run parallel, the clinicapathological research of congenital Malaria will be one of the most interesting points of our field.

As a new additional work, polio vaccine study requested from EPI.HQ, will start in collaboration with virology unit. This is one of the most interesting and important works in this year. Please have a good communication with the related units.

In addition to this work and on going work which is giving tetanus toxoid to pregnant women, the Epidemiology unit and Immunology unit want to have collaboration in the field of DPT vaccination. There are no exact data about the serum antibody level after DPT vaccination against Diphtheria, Tetanus and Pertussis antigens in this country. There are another data about immunological abnormalities, of the children who have Malaria. Both units requested us to collaborate this work. We will offer antigens and APDT vaccine which you want to use this work. Under the understanding of Japanese Domestic Comittee of JICA project in Ghana, we will make our effort in this field. This collaboration is also include the quality control of serum antibody. Concerning to this work, I would like to recovered to JICA to have counterpart who want to learn ELISA system and new DPT vaccine from the epidemiology or immunology unit of our hospital.

Finally, I would like to ask all the members of the epidemiology unit. Within one year, you published 6 papers about

your research. This is good advance in this field. However all papers were published in Ghana. Please extend your business to some other international journals.

4－3　栄養学

岸　恭一

栄養ユニットは、現野口研プロジェクト開始に際して新設され、ほぼ3年が経過した。1988年1月には、Ghana Atomic Energy Commission（GAEC）出身の Dr. Takyi がユニットの Acting head に着任した。その間、栄養ユニットのスタッフにおおきな移動はないが、日本および第三国研修に出たり、National serviceとしてユニットに配属されてきた者もいる。栄養ユニットの研究活動は、野口研プロジェクト開始時に決められた実施計画に沿って行なわれてきている。今回、8月3日午後と4日午前・午後の計1日半かけて、ユニットのメンバー全員出席のもとに、この1年間のユニットの活動について詳しく討議した。その結果と評価および問題点について以下に報告する。

1. 栄養ユニットのスタッフ

栄養ユニットに配属されているメンバーは以下の通りである。

Acting head;	B. B. K. Takyi, Ph. D.
Research fellow;	Ms. Margaret A. Armar
Research assistant;	Ms. Lucy A. Brakohiapa
	Ms. Juliana Yartey
	Mr. A. Bille
	Mr. B. Harrison
Senior technician;	Mr. B. A. Addo
Technician;	Mr. B. Quansah
National service;	Mr. D. O. Kennedy
Cleaner;	Mr. A. Y. Acheamong

この内、現在野口研で研究活動に携わっているのは6人のみである。Armar は現プロジェクト開始前からロンドン大学に留学しており、2～3年前から今にも学位がとれて帰国するような話であったが、未だ野口研に復帰していない。今年の9月には帰る模様。Yarteyは昨年11月から琉球大学に研修にきており、来年1月まで日本にいる予定である。Bille は、修士号取得のため、昨年よりインドネシアに留学している。本年から、National serviceを終えたHarrisonとQuansah が野口研の職員となり、Kennedy が新しく National service として配属された。現在はスタッフかやや手薄になっているが、スタッフの数としては他のユニットと同程度配属されており、これ以上は望むのは無理であろう。研修・留学で実力を蓄えた者が帰国し、活発に研究してくれることを期待したい。

Acting head の Dr.Takyi は、クマシ大学（生化学・食品科学専攻）を1970年に卒業し、バーミンガム大学の放射線生物学で修士号（1975年）と博士号（1977年）を取得している。1970～1987年の17年間ＧＡＥＣに勤務し、残留農薬と食品へのγ線照射の研究を行なった。その間、1970～1983年 Research fellowおよび Senior research fellow 、1983～1985年 Acting director of GAEC、1985～1987年 Head of Department of Chemistryをそれぞれ務めている。これらの経歴から分かるように、Dr. Takyi はもともと栄養の専門家ではない。Dr.Takyiが unit head になることに対して、栄養・食品科学科長の Orraca-Tetteh教授は非常に反対したということであるが、それがどうして栄養ユニット長になったのかは不明である。栄養の専門家でないことは着任当初から明らかであったが、研究歴は長く、栄養の研究においてもなんらかの指導力を発揮してくれるものと期待していた。1988年８月の評価の際には、着任後あまり時間もたっておらず、野口研全体や栄養ユニットの活動状況も把握できないので、十分な活動ができないきかも知れないと好意的に解釈した。しかし、今回 Dr.Takyi が Coordinating Committee に報告した研究活動の中には Dr.Takyi が直接研究あるいは指導したものは殆ど全く見あたらない。実施計画に記された研究を行なっていないだけではなく、昨年の Unit meeting で自分からやりたいと提案したアルファルファの離乳食への応用および離乳用食品の残留農薬の分析についても全く実施していない。野口研には毎日来ているようであるが、スタッフとはほとんど話さず、自室のドアに“レゴンに行く”というような張り紙をして短時間でいなくなるようである。栄養の専門家でない点については詮議しないとしても、ユニットに活動に対してなんら寄与しないのであればユニット長としての資格はない。赴任してから１年半経過しており、注意したほうが良いと考え、Unit meetingおよびCoordinationg Committee において、“指導力を発揮してくれないと困る”旨の発言をしておいた。しかし、本人は弁解するのみで、なんら努力するという約束をせず、活発な研究活動を Dr.Takyi に期待するのは今後も無理であるという印象を受けた。但し、 Dr.Takyi はこれまでのところユニットに積極的な貢献はないものの、逆に積極的な障害にもなっていないようである。

2. 栄養ユニットの活動状況

初年度（1986～87）は離乳食の問題、２年目（1987～88）はビタミンＡの測定を中心に研究してきたが、この１年間は、これまでの研究を継続するとともに、北部地域の小児の栄養調査を開始した。

１）離乳食に関する研究

初年度の研究結果から、適当な離乳食を与えることなく、いたずらに長期間母乳栄養を続けることが、小児に低栄養をおこす１つの原因となっていることが示唆された。そこで昨年より、長期間の母乳栄養を余儀なくしている原因を明らかにする目的で、適切な離乳開始時期と乳児が離乳食を受け付けない理由について調査した。Comoa-Fettehと Ashalley-Botwe

の2つの村で、21カ月齢までの幼児をもつ 121人の母親を集め、離乳開始・終了時期、離乳食の内容、タブーなどについて聞き取り調査を行なった。さらに、4種類の栄養価の異なる離乳食を作製してそれぞれの母親に預け、幼児に与えさせた。2週間に1度村にでかけ、対象児の身体計測を行なうとともに、母親にインタビューし、幼児の離乳食に対する反応を尋ね、また残りの離乳食を秤量した。これらの調査を半年以上の期間をかけて行ない、その結果、ガーナにおける離乳食の問題点のいくつかを明らかにし、離乳食に関して母親に栄養教育を行なう必要性を示した。この方法により、ある程度の結果は得ているものの、研究計画の目的が絞りこまれておらず、実施方法が粗いので、期待されるだけ十分な成果が挙がっていない。ガーナにおける離乳の問題点を、離乳の時期、離乳食の組成・調理法・栄養価・味、離乳食投与法、幼児の離乳食に対する好み、幼児の状態との関係、母親の態度・知識・考え方、家　庭環境、経済状態など、いろいろな側面を1つ1つ明らかにし、問題を解決していく必要があると思われる。また、2週間に1回だけ村を訪れて、母親にインタビューするだけでは、データの妥当性や信頼性に欠ける可能性があり、真の問題点を明らかにするのは困難であろう。スタッフが限られており、多人数の被経験者の詳細な調査は容易ではないが、より肌理の細かい研究が望まれる。

2）経口補液

当初のプロジェクトには入っていなかったが、昨年度ユニセフより、ユニセフが長期間保存している経口補液製剤について品質検定の依頼があり、成分分析を行なった。ユニセフの経口補液製剤は有料であるため、安価ではあるといっても買えない（買わない？）人々がいる。そこで一般の家庭で用いられているケンケ水、米のとぎ汁、ココナッツジュースなどの糖質、電解質組成を分析し、経口補液としての良否について検討した。現在のところ分析しか行なっておらず、動物実験や臨床研究はやられていない。経口補液に関しては分析を少し追加したのみで、この1年間の進展はあまりない。

3）ビタミンA

昨年度の古庄専門家の指導により、ビタミンAの高速液体クロマトグラフィーによる分析が可能となった。そこで手始めとして正常値を求めるために、野口研職員49人を対象に血中ビタミンAを測定した。さらに、Comoa-Onyadze の0才から40才の 115人について、血中ビタミンA、レチノール結合タンパク質を測定するとともに、血中窒素成分及び脂質成分を分析した。その結果、5才以下の小児では、血中ビタミンAが許容範囲にあったのは15％に過ぎなかった。そこで、この低ビタミンA血症の小児に10,000 IU および20,000 IU のビタミンAを2週間の間隔をおいて経口投与したが、血中レベルの上昇が観察されていない。この結果を吸収の問題や他の栄養障害のためであると考えているが、実際には食事調査、その他の追跡調査は行なっていない。また、WHO/UNICEF/USAID他の合同報告では12カ月齢未満の幼児では100,000 IU、1才児以上では200,000 IUのビタミンA投与を推奨しているにもかかわ

らず、投与量の問題については検討していない。

1989年初めより開始しているガーナ北部地域の栄養調査では、ビタミンA欠乏症に重点をおいて行ない、原因・予防・治療の全体にわたりビタミンAの研究を発展させていくてことにしている。

4）ガーナ東北部地域における小児の栄養状態調査

ガーナ北部の食料事情は南部海岸地域よりも劣っており、ビタミンA欠乏症の疾病率も高いと指摘されているが、血中ビタミンA、レチノール結合タンパク質などに基づく確定診断や潜在性の欠乏症の程度、地域住民の罹患率に関して、信頼に足る成績はない。そこでこれらを明らかにするために、Binaba地区のとくに小児を対象に、地区のヘルスセンターの協力のもとに、1989年はじめより人口統計学的、社会・経済的背景について調べるとともに、食事調査ならびに栄養調査を開始した。未だ十分な成績は得られていないが、4才から成人までを含む 189人の食事調査の結果では、各年齢層ともエネルギー摂取量は推奨量の40～70％であった。タンパク質摂取量は4～12才の小児では推奨量の90％以上であったが、13才以上の対象者では60～90％の幅が見られた。また、動物性タンパク質摂取量は約5％に過ぎず、タンパク質摂取量のおよそ半分は主食のきびから摂取しており、タンパク質の質はかなり劣っていると考えられる。ビタミンとミネラルについてみると、ビタミンB_1や鉄は所要量をほぼ満たしているが、カルシウム摂取量は推奨量の約半分であり、レチノール摂取量には個人差が大きかった。今後さらに長期にわたる肌理の細かい調査を行なうとともに、季節変動についても調べる必要がある。

5）ヨード欠乏症

ヨード欠乏症がガーナ中部から北部地域にかけて存在することが、FAO/WHO により1988年に報告されている。また、保健省もヨード欠乏症をガーナの栄養問題の1つにとりあげている。そこで Dr. Takyi は、野口研の栄養ユニットを中心に、疫学、寄生虫、血液学を含む4ユニットが保健省と共同で、ヨード欠乏症の問題に取り組む計画をたて、カナダの International Development Research Centerに研究費の申請を行なっている。

70地域の10万人について、甲状腺機能の状態、ヨード欠乏症の蔓延度、原因などを4～5年かけて明らかにする、という遠大な計画である。研究の目的は非常に良いのであるが、実施計画は具体性に乏しい。それだけ大がかりなプロジェクトでありながら、栄養ユニットの誰にも相談しておらず、ユニットミーティングで聞かされたメンバーは唖然とした。Dr. Takyi にとってヨード欠乏の研究は初めてであるが、それ相当の準備が全くなされていない。先にも触れたように、Dr. Takyiはこれまでの栄養ユニットの活動にほとんどかかわっていないばかりか、昨年度のCoordinating Committeeに自分が報告したアルファルファと残留農薬の2つの研究課題に対してもこの1年間何ら仕事をしていない。今回のヨード欠乏に関する研究ではそうあってはしくないものである。ユニットの活動を充分に把握し、スタッフの人

数、能力にあったバランスのとれた研究計画を立案し、スタッフと事前によく相談すべきであろう。

3. 専門家の派遣・研修員の受け入れ

1）専門家の派遣

現栄養専門家の志塚氏の任期は本年10月17日までである。志塚専門家の後任として、ＪＩＣＡライフワーク専門家の力丸氏を8カ月間の予定で派遣したい。また、来年4月からは木戸氏（徳島大学医学部栄養学科助手）を1年間の予定で派遣することを考えている。

2）研修員の受け入れ

Ms. J. Yartey が昨年11月より琉球大学に研修にきており、2カ月延長して来年1月まで日本にいる予定。来年度の研修生は徳島大学で受け入れが可能。

4. ジョイントカンフェランスについて

保健大臣、次官、ＷＨＯ代表、日本大使、ガーナ大学長、宍戸団長、本多顧問等の出席のもとに、ガーナ大学 The Great Hall において開会式が盛大に挙行され、3日間のカンフェランスが開幕した。開会式においてＷＨＯアフリカ代表による基調演説があり、またカンフェランスでは、ガーナ側からDr. Afari および Dr. Commey、日本側から本多先生、神谷先生および速水先生による特別講演があった。一般講演も21題発表れ、活発な質疑応答が繰り広げられ、有意義な学会となった。発表時間は余り守られていないようであったが、よく組織された立派な会であった。栄養分野では、特別講演1題と6－7題の研修発表が行なわれ、その内の3－4題が野口研からの発表であった。国柄を反映してか基礎的・実験的研究よりも実際的問題をとり挙げたものが多かった。それはそれでよいのであるが、掘り下げた研究は少なく、栄養分野の発表に関しては、研究の完成度、学問的価値は今1つであるのが多いように思われた。しかし、皆自身をもって発表しており、自分たちの研究を批判してもらえる良い機会となった。ディスカッションにも積極的に参加し、会場は活気にあふれていた。野口研の若々しさ、発展の機運をうかがわせるものであり、たのもしく感じた。Joint Conferenceは成功裡に終わったといえよう。

5. おわりに

総括すると、栄養ユニットに問題はなくはないが、研究活動は実施計画に従って概ね順調に行なわれているといえる。National service出身者など活動的な若者が育っており、うまく指導すれば自立に向けて大きな原動力になると考えられる。今後は、他のユニットと合同でプロジェクトを組み、またビタミンＡや離乳食など同様な栄養問題に取り組んでいる保健省やユニセフとの連携を強め、より広範囲な調査、より深い研究を行なうことが望まれる。その点でも

Unit head の強力な指導力が要請される。

4－4　プロジェクト全般

本多　憲児

ガーナ大学基礎医学研究所（通称　野口英世記念研究所）が設立されて10年になり、10周年祝賀シンポジウムが開催された。私も特別講演者の1人として「最近の医学の進歩」（癌について）を講演した。

研究所のテーマである疫学、感染症、栄養、ウィルス等に関する発表はガーナ・カウンターパートは勿論、日本人専門家の講演も非常に充実し、質疑応答も多く、第1回シンポジウムに比較し、非常に活発であったことが強く印象づけられた。

このことはガーナ国の経済状態の改善に伴う、頭脳の環流即ちカウンターパートの充実によるものと考えられた。カウンターパートの多くは欧米又はWHOにて勉強した人であり、理論的構成も優れていた。また日本人専門家の指導による実地訓練もやっと実を結び、今後数年内にはガーナ人のみにて研究所の運営、研究の進行をみることが出来るのではないかと明るい見通しがたてられたと思う。

問題は財政的事情で、彼等自身で研究をすすめることが出来る能力があっても資機材の面で余裕のないことは明らかである。

ガーナ、日本医療協力がはじまってからかれこれ20年、研究所が出来て10年になり、1つの節目である。今後はウィルス部門の強化を図り、また疫学的にはVaccination による乳児死亡率の低下をガーナ政府厚生省とのタイアップにて進行すれば西部アフリカに於ける一大研究基地になるものと思う。

また今回の調査にてWHO中島総裁の提唱するポリオの絶滅運動に対し本研究が積極的に協力を行うことを両国間で決定したことは、日本の医療協力の本質を示すものであると考えられた。

私の癌に関する講演は食道癌、肝癌手術例の5年生存率をのべ、更に最新の癌化学療の一部についてものべたが、レベルの差は大きく又臨床医家の参集が少なく、多くは基礎医学者の集りであるので反響は余り大きくはなかった。

ガーナ国の栄養の改善、Vaccination 施行等による平均寿命の延長に伴い、癌や心臓病等の早期診断、早期治療も必要になるものと思う。ガーナ人のうち金持ちの人はガーナ国内では機能しているレントゲン装置が働かないため診断のためのみにわざわざロンドン迄行かなければならない現状を見て、基礎的研究陣容が揃った今日、臨床面についても一考を要する時期に来ているのではないかと感ぜられた。

医学は社会科学の一部であると共に基礎医学と臨床医学は車の両輪であることを忘れないようにすることが必要である。

ガーナ国の発展に目を見張るとともに基礎医学研究の重要性を関係者に強く訴えたことは非常に有意義であったと考えられた。

GHANA - JAPAN JOINT SCIENTIFIC CONFERENCE
IN COMMEMORATION OF THE

10TH ANNIVERSARY

OF

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH

1979 — 1989

PROGRAMME

7TH - 9TH AUGUST, 1989
UNIVERSITY OF GHANA
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(JICA)

DR HIDEO NOGUCHI (1876 – 1928)

Japanese Bacteriologist and Pathologist, born in Fukushima Prefecture of Japan on November 9th, 1876. After studies in Kitazato's Institute (Japan) and Pennsylvania University (U.S.A.), he worked at Rockefeller Institute for Medical Research (U.S.A.) to investigate Trachoma, Spirochaetes, Yellow Fever, Oroya Fever, etc. He was a member of the American Association of Pathologists and Bacteriologists, Society for Experimental Biology and Medicine, Harvey Society, Society for Experimental Therapy and Pharmacology, Society for Clinical Serology and Haematology (President, Councillor) and many others.

In 1927, he arrived in Accra as a regular member of Rockefeller Institute to investigate Yellow Fever. His studies were practically completed when he died in Accra on May 21st, 1928 of Yellow Fever.

GHANA –JAPAN JOINT SCIENTIFIC CONFERENCE

THEME: CURRENT TRENDS IN THE DIAGNOSIS, TREATMENT, CONTROL AND PREVENTION OF COMMUNICABLE DISEASES AND MALNUTRITION IN GHANA

DATE: 7TH - 9TH AUGUST, 1989

VENUE: THE GREAT HALL AND COMMONWEALTH HALL- LECTURE THEATRE, UNIVERSITY OF GHANA, LEGON

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PLANNING AND IMPLEMENTATION COMMITTEE

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	Mr. D Agbodaze
	Dr. NK Avisi
	Dr. ME Aryeetey
	Dr. F Shizuka
	Dr. H Sakatoku
	Mr. H Eguchi
	Mr. MA Appawu
Secretary:	Mrs. A Lamptey

OPENING SESSION

MONDAY, 7TH AUGUST, 1989.

Morning

Venue: The Great Hall, University of Ghana, Legon

8[00] Registration of participants and arrival of guests

9[00] Welcome address and introduction of the Chairman
Prof. JAA Mingle
Ag. Director, NMIMR

Chairman: Nana Akuoko Sarpong
Secretary for Health

9[10] Opening Address — Prof. A Sawyer
Vice Chancellor
University of Ghana

9[35] Address — Prof. A Shishido
Head of JICA delegation to Ghana

9[45] Keynote Address — Dr. AP Bulengo
WHO Representative for Ghana

Topic: The role of Non-governmental Agencies
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10[20] Chairman's Remarks

10[30] BREAK

SCIENTIFIC SESSION

Venue: Lecture Theatre, Commonwealth Hall, Legon

COMMUNICABLE DISEASES

Chairman: Prof. Hutton A Addy
Head, Department of Communicable Diseases,
UST, School of Medical Sciences

11[10]- Introduction of Chairman:
Dr. BD Akanmori
Ag. Head, Immunology Unit, NMIMR

11[15]- P-1 Two Dose Vaccination Trial With the Trivalent Oral Poliomyelitis (Sabin) Vaccine in Ghana.

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[1]Virology Unit, NMIMR [2]Central Virus Lab., NIH, Japan

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H Sakatoku[1, 2], T Nakano[1, 3] and EA Afari[1]
[1]Epidemiology Unit, NMIMR [2]JICA
[3]Mie Univ. Hosp., Japan

11[55]- P-3 Comparative Rubella Sero-epidemiology in Pregnant Women and Female University Students in Ghana.

TK Adiku[1], T Yoshii[2, 3], M Osei-Kwasi[2] and V Attoh[4]
[1]Microbiol. Dept., UNIV. of Ghana Med. Sch.
[2]Virology Unit, NMIMR [3]Central Virus Lab., NIH, Japan
[4]Ridge Hosp., Ghana

12[15]- Chairman's Remarks

12[30]- LUNCH BREAK

Afternoon

Chairman: Dr. F Grant
Consultant, Global 2000

2[25]- Introduction of Chairman:
Dr. M Osei-Kwasi
Research Fellow, NMIMR

2[30]- LECTURE
Dr. EA Afari
Ag. Head, Epidemiology Unit, NMIMR

Topic: The role of NMIMR in the Diagnosis, Treatment and Prevention of Communicable Diseases in Ghana.

3[15]- P-4 Survey of Entero Pathogenic Agents in Children with and without Diarrhoea in Ghana.

T Nakano[1,5], H Sakatoku[1,6], FN Binka[1], EA Afari[1]
D Agbodaze[2], ME Aryeetey[3] and JAA Mingle[4]
[1]Epidemiology Unit, [2]Bacteriology Unit, [3]Parasitology Unit, [4]Virology Unit, NMIMR [5]Mie Univ. Hosp., Japan
[6]JICA

3[35]- P-5 Pollution Indicator Bacteria Associated with Coastal Waters in Ghana.

D Agbodaze, AK Aidoo, DK Lotsu, HEK Longmatey and SN Afoakwa
Bacteriology Unit, NMIMR

3[55]- P-6 An Update on the Microbial Quality of Fresh Water Prawns (Macrobrachium spp.) from the Volta River and its Possible Health Implications.

C Amoah[1], GT Odamtten[2] and D Agbodaze[3]
[1]VBRP [2]Dept. of Botany, Univ. of Ghana
[3]Bacteriology Unit, NMIMR

4[15]- Chairman's Remarks

4[30]- Closing

TUESDAY, 8TH AUGUST, 1989

Morning

NUTRITION

Chairman: Prof. EQ Archampong
Dean, University of Ghana Medical School

Co-Chairman: Prof. K Kishi
Department of Nutrition, School of Medicine,
University of Tokushima, Japan

9[00]- Introduction of Chairmen:
Dr. EEK Takyi
Ag. Head, Nutrition Unit, NMIMR

9[05]- LECTURE
Dr. JOO Commey
Head, Dept. of Child Health,
Korle Bu Hospital, Ghana

Topic: Nutrition and Child Development

9[50]- P-7 Does Prolonged Breast Feeding Adversely Affect a Child's Nutritional Status?

LA Brakohiapa[1], A Bille[1], E Quansah[1], K Kishi[2], J Yartey[1], E Harrison[1], MA Armar[1] and S Yamamoto[1, 2]
[1]Nutrition Unit, NMIMR [2]Univ. of Tokushima, Japan

10[10]- P-8 Improving Young Child Feeding Practices in Ghana.

R Agble
Nutr. Div., Min. of Health, Ghana

10[30]- BREAK

10[50]- P-9 Nutrient Intake and Milk Yield of Lactating Rural Ghanaian Women.

A Lartey and R Orraca-Tetteh
Nutr. and Food Sci., Univ. of Ghana

11[10]- P-10 Nutritional Status of Children in a Rural Community in the Upper East Region of Ghana.

F Shizuka[1, 2], E Harrison[1], LA Brakohiapa[1], E Quansah[1], DO Kennedy[1], E Addo[1] and K Kishi[3]
[1]Nutrition Unit, NMIMR [2]JICA [3]Univ. Tokushima, Japan

11[30]- P-11 Contributions of Dietary Protein and Zinc Deficiencies to Protein-Energy Malnutrition in Rats.

E Asibey-Berko
Nutr. and Food Sci., Univ. of Ghana

11[50]- Remarks by Chairmen

12[10]- LUNCH BREAK

Afternoon

NUTRITION AND OTHER TOPICS

Chairman: Dr. ME Adibo
Director, Ghana Medical Service

Co-Chairman: Prof. R Orraca-Tetteh
Head, Department of Nutrition and Food Science,
University of Ghana

2^{00} Introduction of Chairmen:
Dr. PA Addo
Research Fellow, Laboratory Animal Unit, NMIMR

2^{05} LECTURE
Dr. H Kamiya
Director, Mie National Hospital, Japan

Topic: Clinical Trials with the Japanese Acellular Pertussis-Diphteria-Tetanus (APDT) Vaccine.

2^{30} P-12 Vitamin A Status in a Rural Community in Ghana.

T Furusho[1, 2], EEK Takyi[1], A Bille[1], T Nakano[1, 3], E Harrison[1] and E Addo[1].
[1]Nutrition Unit, NMIMR [2]Univ. of Tokyo Agric. Japan
[3]Mie Univ. Hosp., Japan

3^{10} P-13 Nutritional Status and Levels of Liver Enzymes in Some Ghanaian Alcoholics.

IKE Quaye[1], AK Nyarko[1], BD Akanmori[1], PK Nyame[2] and AA Adjei[1]
[1]Immunology Unit, NMIMR [2]Dept. of Med., Univ. of Ghana Med. Sch.

3³⁰- P-14 Serum Lipids and Lipoproteins in Adult Ghanaians.

AK Nyarko[1], KOM Adubofour[2], F Ofei[2], JOM Pobee[2] and SK Onusu[2]
[1]Chemical Pathology Unit, NMIMR
[2]Dept. of Med. and Therapeutics, Univ. of Ghana Med. Sch.

3⁵⁰- P-15 Parasitological Findings in Stool Samples of Children under 5 Years in an Inland Rural Community in Ghana.

ME Aryeetey[1], RK Anteson[2]
[1]Parasitology Unit, NMIMR [2]Dept. of Microbiol., Univ. of Ghana Med. Sch.

4¹⁰- P-16 Male Urethritis in Kumasi

EH Frimpong
Dept. of Clin. Microbiol., Sch. of Med. Sci., Univ. of Sci. Tech.

4³⁰- Remarks by Chairmen

4⁵⁰- Closing

WEDNESDAY, 9TH AUGUST, 1989

Morning

COMMUNICABLE DISEASES AND OTHER TOPICS

Chairman: Prof. A Sugiura
Director, Department of Measles Virus, NIH, Japan

Co-Chairman: Prof. CO Easmon
Medical Practitioner

9⁰⁰- Introduction of Chairmen:
Dr. ME Aryeetey
Ag. Head, Parasitology Unit, NMIMR

9⁰⁵- LECTURE
Prof. K Honda
Director, Honda Memorial Cardiovascular Medical Centre, Japan

Topic: Recent Advances in Cancer Therapy

9⁵⁰- P-17 Field Evaluation of Simple and Rapid Assays for Antibody to Human Immunodeficiency Virus (HIV) in Three Population Groups in Ghana

JAA Mingle[1], M Osei-Kwasi[1], S Mitchell[2], D Hanson[2] and P Antwi[3]
[1]Virology Unit, NMIMR [2]AIDSTECH/FHI, USA
[3]Epid. Div., Min. of Health, Ghana

10¹⁰- P-18 Enterotoxigenicity, Presence of Colonization Factor Antigens and Adherence to Hela Cells by Escherichia Coli Isolated from Children with Diarrhoea in Ghana.

D Agbodaze[1], BD Akanmori[2], DK Lotsu[1], AK Aidoo[1], CA Abraham[1], AK Dodoo[4] and JB Barnor[3]
[1]Bacteriology Unit, [2]Immunology Unit, [3]Virology Unit, [4]Electron Microscopy Unit, NMIMR

10³⁰- P-19 Evaluation of the Efficiency of the Trivalent Oral Poliomyelitis (Sabin) Vaccine in Young Infants in Urban and Rural Areas in Ghana.

M Osei-Kwasi[1], T Yoshii[1, 2] and JAA Mingle[1]
[1]Virology Unit, NMIMR
[2]Central Virus Diagnosis Lab., NIH, Japan

10⁵⁰- Remarks by Chairmen

11¹⁰- BREAK

Chairman: Prof. RKG Assoku
Head, Department of Animal Science,
University of Ghana

11³⁰- Introduction of Chairman:
Mr. IKE Quaye
Research Fellow, N.M.I.M.R.

11³⁵- P-20 Very Low Levels of Aflatoxin B_1 and Glyoxylase-I Activity in Mouse Colon and Liver.

N-A Ankrah
Chemical Pathology Unit, NMIMR

11⁵⁵- P-21 Concept Review of Antiviral Chemotherapy

NK Ayisi
Virology Unit, NMIMR

12²⁰ LECTURE
Prof. M Hayami
Institute for Virus Research, Kyoto University, Japan

Topic: Seroreactive Patterns and Isolation of HIV in Ghana.

1⁰⁵- Chairman's Remarks

1¹⁵- Closing Address — Prof. JAA Mingle
Ag. Director, NMIMR

1²⁵- Vote of Thanks — Mrs. A Lamptey
NMIMR

NOTES ON DISCUSSIONS BETWEEN THE JAPANESE ADVISORY SURVEY TEAM AND THE AUTHORITIES OF THE UNIVERSITY OF GHANA ON THE PROGRESS OF RESEARCH ACTIVITIES IN THE TENTATIVE IMPLEMENTATION PLAN OF THE NOGUCHI MEMORIAL INSTITUTE PROJECT

The Japanese Advisory Survey Team organized by the Japan International Cooperation Agency visited the University of Ghana in the Republic of Ghana from 2nd to 11th August, 1989, in order to evaluate the progress of research activities of the Noguchi Memorial Institute for Medical Research as stipulated in the Tentative Implementation Plan for the "Noguchi Memorial Institute Project".

During its stay in Ghana, the Team reviewed the Institute's programme of work being carried out under the auspices of the Ghana/Japan Medical Cooperation Programme and held a series of discussions with the Authorities of the University of Ghana in respect of the Project under consideration.

As a result of the review and the discussions, the two parties agreed that the Project was progressing satisfactorily, as indicated in the attached Reports.

11th August, 1989
Legon, Ghana

A.K. Sawyerr

Professor A. Sawyerr
Vice-Chancellor,
University of Ghana

A. Shishido

Professor A. Shishido
Head,
Advisory Survey Team,
JICA

A PROGRESS REPORT FROM THE VIROLOGY UNIT, NMIMR

PREPARED BY Nana K. Ayisi, DVM, PhD

AUGUST, 1989

The objectives set out for the Unit in the tentative implementation plan are: (1) to provide diagonostic services for viral infections, (2) to improve the efficiency and effectiveness of the national immunization program, and (3) to collaborate with other Units in the study of the epidemiology of viral diseases. The following services and research projects have been carried out or are being investigated in the Unit.

A Summary for the past three years

1. Provision of diagnostic services for viral infections

(a) Serological diagnoses for HIV by immunofluorescent antibody test (IFAT) and Western Blot test, yellow fever by IFAT and neutralization test, measles by neutralization and hemagglutination inhibition test (HIT), poliomyelitis by neutralizaiton test, and rubella by HIT have been done. The Unit serves as the confirmatory center for HIV infections in Ghana.

(b) Isolation of HIV-1 and 2 was done by coculturing lymphocytes from suspected AIDS patients in H-9 cells and looking for giant cell formation (CPE). The HIV-1 or 2 were purified from the infected cells. For identification, both monoclonal antibody neutralization and genetic analysis techniques were used.

(c) HSV was isolated from a genital swab, identified by antibody neutralization test, and typed by BrVdUrd inhibitory effect.

(d) Coxsackie A24 isolates were obtained from swabs of acute hemorrhatic conjuctivitis infections and identified by antibody neutralization tests.

(e) Rotavirus was visulised and identified as one of the etiological agents in infantile diarrhoea in Ghana by the virus neutralization and electronmicroscopy techniques.

2. Improving the efficientcy and effectiveness of the national immunization program

(a) Potency tests on poliovirus, measles, and yellow fever

vaccines have been routinely performed on vaccines intended for use by the Epidemiology Division, Ministry of Health, and UNICEF.

(b) The effectiveness of the "cold chain" for vaccines imported into the country has been monitored by examining the colour indicator cards and state of dry ice in the containers, and doing potency tests on the vaccines both before and during the immunization compaigns.

(c) Serological tests for antibody rise after vaccination with polio virus has been continued in the Greater Accra Region.

(d) A "new" WHO schedule for poliovirus vaccination starting the four dose schedule at birth was evaluated with good seroconversion.

(e) A two dose schedule for poliovirus vaccination using double the normal dose was evaluated with good seroconversion Further studies are planned to compare the two dose schedule with the normal four dose schedule in a double blind seroconversion study.

(f) We have assessed the seroconversion rates of polio vaccination in Developing Countries in collaboration with WHO. Our results compared favourable to those from other centers.

3. Collaboration with other units in the study of the epidemiology of viral diseases

(a) We have collaborated with the Epidemiology unit in assesing the seroconversion rate of measles vaccination at three villages in southern Ghana in order to determine the optimal age for measles immunization. The results indicated that measles immunization can be administered effectively at the age of seven months.

(b) We have collaborated with the Epidemiology Unit in assessing the role of rotavirus in infantile diarrhea at two Ghanaian villages. At Gomoa-Onyadze, the incidence was 6.9% but at Gomoa-Fetteh, the incidence was more than 35%.

4. Other research activities

(a) We have undertaken the surveillance of HTLV-I and III confirmation by the immunofluorescent and Western Blot

techniques. In recent times, this work has been sporadic due to the lack of reagents.

(b) We have evaluated Confirmatory Centers for HIV infections using WHO panel of reference sera in collaboration with WHO.

(c) Sero-egidemiologic studies of rubella virus infection in the Ghanaian population revealed the need for vaccination against the virus.

(d) We have evaluated three "rapid" and simple methods for the detection of HIV antibodies in collaboration with Family Health International/USAID and Ministry of Health, Ghana. These kits or methods were; Serodia, HIV chek, and Retrocell. In all, 1800 serum samples were evaluated.

(e) Work on Coxsackie A24 isolates from acute hemorrhagic conjunctivitis cases have been undertaken utilizing restriction endonuclease analysis to construct a phylogenetic tree. The results indicate that Coxsackie A24 variants isolated, may have been introduced into the country more than four years before their isolation, i.e. before 1983.

(f) During the past year the WHO sent two teams to assess the suitability of the Unit as a Reference Center for AIDS Confirmation Test and involvement of the Unit in the laboratory support for the global eradication of poliomyelitis. The Unit is currently being considered as a training center for personnel involved in EPI programs in Africa.

(g) The most recent addition to research in this Unit is in the area of Antiviral chemotherapy. In this respects, comparative studies of standard antiviral drugs with plants known to have antiviral activities is being undertaken. Some of the viruses being studies are herpes simplex, varicella-zoster, cytomegabvirus, poliovirus, measles, yellow fever, and Coxsackie A24. This project is in collaboration with the Center for Scientific Research into Plant Medicine, Mampong.

B. Details of projects undertaken in the past year (August 1988 - August 1989)

1. AIDS still remained the most highlighted viral infection during the year under review. With the help of Family Health International, USA, we obtained reagents to do an

extensive research into the possible use of three HIV detection kits under field conditions. Serum specimens were screened by HIVchek. All reactive, indeterminate, and 10% of the nonreactive specimens by HIVchek were tested by Serodia, Retrocell and by Western blot for HIV1 and HIV2. For these analyses, Western blot positive is defined as being reactive for HIV1 or both HIV1 and HIV2. The tests were performed at Akwatia, Koforidua, Atua, Battor, Tema, Korle-Bu and N.M.I.M.R. In all, one thousand eight hundred (1800) serum samples were tested. Parameters studied were (1)predictive value, (2)sensitivity (3)specificity, and (4)test efficiency. The results indicated that under field contions the three tests performed satisfactorily (see tables 1,1A,2B, and 2C). These tests may therefore be appropriate for use in screening blood donors, persons practising high risk behaviours, and suspected AIDS cases.

2. An epidemic of acute hemorrhagic conjunctivitis, (AHC) occured in Ghana in 1987. The major causative agent was isolated and identified as Coxsackie A24 variant (CA 24 v). This was the first diagnosed CA 24v-related epidemic of AHC in an African country south of the Sahara, which is also outside the endemic areas of Southeast Asia and the Carribean. Two antigenic types of CA 24v, namely, EH 24 and NV-87-37 were determined. The former was neutralized with antiserum against the prototype strain of CA 24, i.e. EH 24/70 originally isolated in Singapore in 1970 while the latter was neutralized with antiserum prepared in guinea pgis and rabbits against NV-87-37 virus. Further studies have been done on 7 of the viral isolates by RNA genome fingureprinting. Genetic similarity among the strains ranged between 59% and 80% (see table 3). The rate of base substitution in the RNA genome was estimated to be 0.3% per nucleotide per year. Using base sequence variations deduced from genetic similarities among the isolates, the rate of base substitution in the RNA genome, and isolation times of the strains, divergence time was calculated and a phylogenetic tree constructed. The results indicated that all 7 isolates had diverged from each other about 2 to 4 years before the AHC epidemic in Accra. The above genetic engineering work formed part of the technical training program for Mr. J.A.M. Brandful in Japan.

3. A serological study on measles vaccination was carried in three villages in the central region of Ghana in collaboration with the Epidemiology Unit. Live hyperattenuated measles vaccine (Schwarz strain, not less than 1,000TCID50) was inoculated subcutaneously into infants

at between 7 and 7.99 months. Measles antibodies in pre- and post-immunization samples from each child were determined by hemagglutination-inhibition test (HIT). The seroconversion rate for the total population studies was 81.1%, but 91.5% for infants who were seronegative at the time of immunization (see table 4). These results indicate that measles immunization can be effectively obtained at the age of seven monts.

C. Projects under investigation and those planned for the next years

1. Antiviral Research has gained top priority position in many research organizations including the National Institutes of Health, USA. The Virology Unit has started a collaborative research with the Center for Scientific Research into Plant Medicine, Mampong. Selected plant extracts are being evaluated for their possible effects on varicella-zoster, cytomegalsvirus, herpes simplex virus, yellow fever virus, and poliovirus. The unit intends to ask for WHO support.

2. Persistent febrile cases which prove negative for malaria infection could be due to certain viruses like Lassa. The unit plans to investigate this possible cause by serological diagnosis as well as virus isolation.

3. Intrahepatic jaundice can be caused by three major viruses. These are hepatitis B virus, cytomegalovirus, and yellow fever virus. The unit intends to investigate these etiological agents by serological diagnosis and virus isolation.

4. In 1986, the isolation of a novel human B-lymphotropic herpes virus, HBLV (or HHV-6) that was shown to be distinct from other human herpes viruses was reported by researchers in the USA. Seropositivity have significance not only in patients with lymphoid malignancies, but also in the normal population. In addition, its effect on human lymphocytes has led to a major effort by the research community in the study of HBLV as a primary agent and/or cofactor in several human diseases such as Chronic Fatigue Syndrome. This Unit would like to investigate the possible presence of this virus in Ghana by immunofluorescence assay seroepidemiologgy using a Pan-Data Systems kit. A total of about US$2,000.00 will be needed to purchase kits, positive and negative sera, and anti-human IgM (Chain) affinity purified FITC-conjugate for the initial studies.

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5. The WHO has recently asked Dr. Osei-Kwasi of this Unit to develop a project comparing different doses of polio vaccines produced in the USA and others supplied by UNICEF. Financial support for this project is anticipated from WHO and JICA.

D. Training Program for 1988/1989

1. Mr. J.A.M. Brandful returned from Japan after a one year technical training course.

2. Mr. W.K. Ampofo left for Japan to undertake a one year technical trainign course.

E. Publications

1. Isolation of a retrovirus from an AIDS patient in Ghana and its identification as a variant of HIV2, AIDS, 1989, 2:383-388.

2. Reactivities of antibodies to HIV and SIV in human sera in Kenya, Gabon, and Ghana. Lancet, 1988, 1:297.

3. A report on human immunodeficiency virus (HIV) infection in Ghana up to December 1986, Ghana Med. J. 1987, 21:7-11.

4. Sexual habits and social factors in local prostitutes which could affect the spread of human immunodeficiency virus (HIV). Ghana Med. J., 1987, 21:12-15.

5. Use of Rappid Assays for Antibody to HIV in Blood Donors, Persons Practising High Risk Behaviour and Suspected AIDS cases in Ghana-Presented at the 5th International Conference on AIDS, Montreal, June, 1989.

6. Prevalence of antibodies to Rubella in Accra.
Bull of NMIMR. Vol 1, Jan. 1988, pp.16-25.

Table 1. Predictive Values in the Evaluation of Three HIV Detection Kits

	Group 1	Group 2	Group 3
Positive Predictive Value		%	
HIVCHEK	76	89	94
SERODIA	75	75	93
RETROCELL	61	90	94
Negative Predictive Value			
HIVCHEK	91	88	100
SERODIA	97	93	100
RETROCELL	91	94	100

Group 1=Blood donors

Group 2=Persons practicing high risk behaviours

Group 3=Suspected AIDS cases

Table 2. Sensitivity, Specificity, and Test Efficiency in the Evaluation of Three HIV Detection Kits (Comparison of Assay Results to Western Blot)

A. Blood Donors

	H[1]	S[2]	R[3]
	n=64	n=55	n=61
Sensitivity	80%	95%	85%
Specificity	89	83	73
Test Efficiency	86	87	77

B. Persons Practicing High Risk Behaviours

	H[1]	S[2]	R[3]
	n=25	n=26	n=27
Sensitivity	80%	90%	90%
Specificity	93%	81%	94%
Test Efficiency	88%	85%	93%

C. Suspected AIDS Cases

	H[1]	S[2]	R[3]
	n=133	n=131	n=129
Sensitivity	100%	100%	100%
Specificity	66%	64%	67%
Test Efficiency	95%	94%	95%

H[1] =HIVCHEK

S[2] =SERODIA

R[3] =PETROCELL

Table 3. Similarity of large RNase T1-resistant oligonucleotides of CA 24v strains

(%)

	STRAIN	1	18	85	92	174	K'133	K'134
Base Sequence Variation (Genetic Distance) (%)	1	-	76.9	73.2	72.7	63.0	63.6	70.0
	18	1.497	-	79.6	76.3	69.7	68.5	77.9
	85	1.777	1.302	-	64.2	63.5	58.5	72.6
	92	1.817	1.504	2.531	-	68.6	65.4	66.6
	174	2.640	2.160	2.594	2.148	-	62.7	69.7
	K'133	2.582	2.160	3.062	2.422	2.662	-	63.1
	K'134	2.034	1.422	1.828	2.320	2.057	2.628	-

Percentage similarity in RNA genomes of CA 24v strains, deduced from pairwise comparison of RNase T1-resistant oligonucleotides in autoradio-graphs. Strain 18 was used as reference for comparison.

The lower left half of table shows the base sequence variation of the strains, equivalent to genetic distance - See text.

Table 4. Seroconversion Rates in Infants Immunized with Measles at Seven Months Old

	Number of Infants	Seroconversion Rate (%)
Seroconversion	43	81.1
Non-seroconversion	4	7.5
Seropositive at the time of immunization	6	11.3
Total	53	100.0

EPIDEMIOLOGY UNIT REPORT 1988/89

General

1. Reference objectives of the Epidemiology Unit under the programme implementation schedule of the NMIMR for 1986/87-1990/91, the unit has been able to carry out the following activities during the past three years:

   a) Extension of the survey area from Gomoa Fetteh to include two other rural communities.

   b) Collection of demographic data every two years in the rural communities.

   c) Primary Health Care activities.

   d) Under five disease surveillance

   e) Control programme for Malaria and Diarrhoeal Diseases

   f) Research in

      1) Malaria

      2) Diarrhoeal Diseases

      3) Nutrition

      4) Seroepidemiology

   g) Collaboration with the Ministry of Health, University of Ghana Medical School in research and provision of services at community levels.

   h) The Institute has provided accommodation and has been collaborating with the University of Ghana Medical School in the training of Community Health Specialist/Epidemiologists.

   i) The Unit has sponsored the training of two Community Health workers for Gomoa Fetteh and the same number for Gomoa Onyadze/Otsew Jukwa.

   j) We have encouraged and supported the community at Gomoa Fetteh in kind and cash to build a three room structure and start a day care centre. The other communities have also been encouraged to start day

care centres in temporary accommodation.

k) The people at Gomoa Onyadze/Otsew Jukwa are also being encourated to put up a community clinic.

2. The Unit's activities continue to be research and service oriented. The following activities were carried out during the period under review.

3. Extension of the survey area in Gomoa Dstrict

The survey area has been extended from Gomoa Fetteh and Gomoa Onyadze/Otsew Jukwa to include Gomoa Mprumem also in the Gomoa District in the Central Region.

4. Collection of Demographic Data

Censuses are conducted evey two years and 1988 was a census year. The villages were mapped out and census conducted in the four villages in July 1988.

5. Table 1 shows that:

a. The total population of the four villages is 4239.

b. Children under five year age group form about 18-20 per cent of the total population.

c. About 58 per cent of total population are illiterates.

d. Infant Mortality Rate is 19.6 per 1000 live births.

e. Under five Mortality Rate is 25.6 per 1000 population.

f. Crude Birth Rate is 47.5 per 1000 population.

g. Crude Death Rate is 12.8 per 1000 population.

h. The Natural Rate of population increase for the four communities is 34.7 per 1000 population or 3.5 per cent. This rate of population growth is very high.

6. Indications are that our primary health care activities have succeeded in reducing death especialy in the childhood population but not births in the four villages. Family planning activities have been intensified in the communities.

Under Five Disease Incidence

7. Acute respiratory illnesses, Malaria, diarrhoeal diseases and skin conditions continue to be the four major causes of morbidity among the childhood population. Although it is too early to assess the effect of the malaria and diarrhoeal diseases control measures introduced in 1988, indications are that incidence of diarrhoeal diseases is gradually decreasing while the trend of Malaria has not changed much when compared with incidence of the previous years (Figs 1-3).

Primary Health Care Services

8. The Unit continues to provide primary health care services at Gomoa Fetteh, Gomoa Onyadze/Otsew Jukwa and Gomoa Mprumem during the year under review. The services were as follows:

Health Education

a. This took the form of talks, discussions, film shows, role plays and demonstrations to address the following:

(i) personal, water, food and environmental sanitation.

(ii) food values, food habits and childcare in general.

(iii) diarrhoeal diseases control with oral rehydration therapy with locally available fluids and ORS.

(iv) malaria control with emphasis on early detection and treatment of the disease especially among the preschool children with readily available anti-malaria drugs.

(v) family planning.

(vi) prevention and control of childhood diseases with emphasis on vaccination against the six vaccine preventable childhood diseases and yellow fever.

Growth Monitoring

b. Measurements of heights and weights of children were taken monthly to monitor the growth of each child.

Treatment of Childhood Diseases

c. An attempt was made to see and clinically examine each child once a week. Those who were found sick were treated with drugs and dressings supplied by JICA and the Ghana Goverment.

Vaccination Sessions

d. Vaccination of children against tuberculosis, Diphtheria, Tetanus, pertussis, polio and measles were done regularly to ensure that at least 80 per cent of children aged between one and two years were fully vaccinated.

e. Pregnant women were also given a course of tetanus toxoid antigen.

Antenatal and Postnatal Clinic

f. These clinics were held once a month at each village to improve the health of the mother and the baby to be born.

Laboratory Support

9. The Parasitology, Immunology, Bacteriology, virology and Haematology Units at the Institute provided support especially in the areas of malaria, diarrhoeal diseases, some skin infections, anaemia and seroepidemiological studies.

Research Activities (Surveys/special Studies)

10. The following research activities were conducted during the year:

Bacterial, Parasitic and viral isolates from acute diarrhoeal and non-diarrhoeal stools from preschool children at Gomoa Onyadze/Otsew Jukwa

a. Diarrhoeal (acute) and non diarrhoeal stools were collected weekly from preschool children for a period

of one year to determine possible aetiologic factors of acute diarrhoeal diseases in preschool children at Gomoa Onyadze/Otsew Jukwa.

b. Results (Tables 2-5) have shown that apart from Giardia lamblia (parasitic) and Rotavirus (viral) isolates which were satistically significantly higher in diarrhoeal stools, there were no significant differences between the rest of the isolates (parasite, bacterial and viral).

Nutritional status of preschool children at Gomoa Onyadze/Otsew Jukwa and Gomoa Fetteh

c. A cross-sectonal study conducted in May 1988 to assess the nutritional status of 512 preschool children at Gomoa Fetteh and Gomoa Onyadze/Otsew Jukwa showed that 2.9 per cent of the children were wasted (acutely malnourished), 28.5 per cent stunted (chronically malnourished) 21.7 per cent stunted or wasted (under nutrition) and 0.8 per cent stunted and wasted. (Tables 6-9).

d. Since selected primary health care services have succeeded in reducing the effect of infections as contributing factor in growth deficit in the preschool child, indications are that the growth deficits in the two communities are due to food habits and inadequate food supply as a result of low income levels from poor agricultural/fishing and trading practices. The situation is also worsened by the high population growth in the two communities.

e. The following measures have been taken to improve the nutritional status of the preschool child:

(i) Education on food values and positive food habits.

(ii) Organization of mothers into a co-operative to produce soap, biscuits and handicrafts on commercial scale to improve their earning capacity.

(iii) Introduction of block farming through Global 2000/Ministry of Agriculture projects.

(iv) Family planning.

(v) Establishment of day care centres to enable a child get at least one balanced diet a day, and also prepare the child for formal education.

Recent Malaria Infection

f. Finger prick blood samples were taken monthly from each infant for microscopy to determine the earliest age at which malaria infection takes place. So far 85 infants have been followed up for a period of 15 months and results indicate that seven infants had been infected at the age of between one and two months and 29 by the age of three montsh (Table 10).

In vivo and in vitro P. falciparum sensitivity status to chloroquine in three communities in Southern Ghana

g. Epidemiology Unit and Immunology Unit in collaboration with the Ministry of Health and Centre for Tropical Clinical Pharmacology and Therapeutics, Ghana Medical School conducted a survey into thesensitivity status of Plasmodium falciparum to choloroquine in schools at Nima and Madina - urban and peri urban communities respectively in the Greater Accra Region and at Gomoa Fetteh, a rural community in the Central Region of Ghana from June 1988 to October 1988. This study, the first of its kind in the country has shown that of the 144 in vivo tests performed, 116 (80.6%) were sensitive to chloroquine and 28 (19.4%) showed resistance to chloroquine at RI (3.5%) and RII (15.9%) levels. There was no P. falciparum resistance at the RIII level (Tables 11, 12, 13).

h. Fifty-four out of the 92 successful in vitro micro tests carried out concurrently with the in vivo tests were resistant to chloroquine (Table 14).

i. The study has shown that P. falciparum resitance to choloroquine has emerged in the country and what is urgently required now is intensive and sustained education on judicious selection and proper use of available compounds, and the promotion of research activities that may provide more data for sound drug policy for malaria treatment in Ghana.

j. This collaboration with the Ministry of Health and the Medical School is continuing to map out P. falciparum malaria parasites sensitivity to

chloroquine in Ghana. The second phase of the study had just been completed in the Volta Region and the results are being compiled.

k. The Epidemiology Unit, Immunology Unit and Centre for Tropical Clinical Pharmacology and Therapeutics organized a seminar on malaria in Ghana in March 1989, as a result of interest generated in our study on P. falciparum sensitivity to chloroquine in Ghana. The seminar was co-sponsored by the Ministry of Health, JICA, WHO and Danafco. the proceedings of the seminar are to be published in the Ghana Medical Journal.

l. It must be emphasised that this study has been made possible, thanks to JICA for ordering the in vitro micro test kits for the unit, and UAC Ghana Limited and the Institute for their financial support.

Antibody responses to Measles, Polio, Tetanus Toxoid Immunization

m. Serological studies are being carried out in the villages to determine antibody responses to measles, polio antigens and Tetanus Toxoid given to infants and pregnant women/new born babies respectively.

n. A serological study was carried out in the three villages to determine the optimal age for measles vaccination. the live hyperattenuated measles vaccine (Schwartz strain) was inoculated sub-cutaneously at the age of seven months. A total number of 53 pair samples were investigated. The seroconversion rate for the population studied was 81.1 per cent but 91.5 per cent for the infants who were seronegative at the time of immunization. These results indicate that the measles antigen can be administered effectively at the age of seven months as well as nine montsh (Table 15).

o. Serological studies to determine antibody responses against Polio and Tetanus toxoid are still in progress and results will be made available soon after studies are completed.

11. Counterpart Training in Japan

One Senior Tehcnician is currently undergoing training in japan.

Japanese Expert

12. Dr. H. Sakatoku has joined the Unit for a period of two years. He took over from Dr. T. Nakano who has finished his tour of duty.

Drugs and Consumables

13. Drugs and consumables are supplied by JICA and the Government of Ghana.

Vaccines

14. Vaccines are supplied locally by the Ministry of Health.

Projects for 1989/91

15. The Unit will continue with:

a) Underfive disease surveillance

b) Primary Health Care services in rural communities.

16. Malaria Project

a) to relate the immune status of infants to P. falciparum infection and disease.

b) to continue mapping out in vivo and in vitro P. falciparum sensitivity to chloroquine and other antimalaria drugs in Ghana.

c) compliance to chloroquine treatment in Ghana.

17. Seroepidemiological studies with DPT and TT, Polio and measles antigens.

18. Haemoglobinopaties/Anaemia

19. Unwanted pregnancies in second cycle institutions in Ghana.

Publication

20. Afari, E.A., Nakano, T., Binka, F., Owusu Agyei, S. Some Demographic Characteristics of two rural communities in Southern Ghana. Ghana Medical J. 1988; 22(3): 59-62.

21. Afari, E.A., Nakano, T., Binka, F., Owusu Agyei, S. Childhood Diarrhoea Morbidity and Treatment Survey. Bull. of NMIMR. 1988: 1(2):5-10.

22. Afari, E.A., Nakano, T., Binka, F., Owusu Agyei, S., Asigbee J.R.K. Malaria infection in childgood population of a rural community in southern Ghana - submitted to the Ghana Medical Journal to be considered for publication.

23. Afari, E.A., Akanmori, B.D., T. Nakano, T., Ofori-Adjei, D. Owusu-Agyei, S., Gyan B., Adjei A. In vivo and in vitro sensitivity status of Plasmodium falciparum to Chloroquine in three communities in Southern Ghana. Proceedings of a seminar on Malaria in Ghana to be published in the Ghana Medical Journal.

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25. Afari, E.A., Nakano, T., Binka, F., Owusu Agyei, O.S., Fenteng, J. and Asiedu, B.K.. Major causes of Morbidity among preschool children in two rural communities in Southern Ghana. Bull. of NMIMR. 1989 2(1): 7-16.

DR. COL. (RTD) E.A. AFARI
HEAD OF UNIT

TABLE 1

SOME DEMOGRAPHIC CHARACTERISTICS OF FOUR COMMUNITIES IN SOUTHERN GHANA - 1988

VARIABLES	GOMOA FETTEH	GOMOA ONYADZE	OTSEW JUKWA	GOMOA MPRUMEM	TOTAL
Males	1,008	251	204	448	1,911
Females	1,233	348	271	530	2,382
Total Population	2,241	599	475	978	4,293
Illiterates	1,198 (57.46%)	313 (55.11%)	296 (69.00%)	491 (54.68%)	2,298 (57.74%)
Literates	887 (42.54%)	255 (44.89%)	133 (31.00%)	407 (45.32%)	1,682 (42.26%)
CDR/ 1000 Pop.	33 14.73	9 15.03	10 21.05	3 3.07	55 12.81
CBR/ 1000 Pop.	104 46.41	27 45.08	21 44.21	52 53.17	204 47.52
IMR/ 1000 Live Births	3 28.60	0 0.00	1 47.62	0 0.00	4 19.61
<5 YRS MR/ 1000 Pop.	16 41.78	1 8.13	3 28.57	0 0.00	20 25.61

Table 2 PARASITIC ISOLATES FROM DIARRHOEAL AND NON-DIARRHOEAL STOOLS
GONOA ONYADZE/OTSEW JUKWA 1987/88

ISOLATES	DIARRHOEAL $n_1 = 196$		NON-DIARRHOEAL $n_2 = 269$		Z-VALUE	P-VALUE
	No.	%	No.	%		
Chilomastix Mesnili	27	13.8	41	15.2	0.442	0.3293
Ascaris Lumbricoides	19	9.7	43	16.0	1.971	0.0244
Giarda Lamblia	30	15.4	18	6.7	3.015	0.001286
Hookworm	6	3.1	14	5.2	1.125	0.1303
Strongyloides Stercoralis	4	2.0	8	3.0	0.627	0.2654
Entamoeba Coli	5	2.6	6	2.2	0.225	0.4111
Entamoeba Histolytica	0	0.0	1	0.4	0.855	0.1964
Trichuris Trichiura	0	0.0	1	0.4	0.855	0.1964
Negative	129	65.8	178	66.2	0.09	0.4682

Table 3 BACTERIA ISOLATES FROM DIARRHOEAL AND NON-DIARRHOEAL STOOLS
GOMOA ONYADZE/OTSEW JUKWA - 1987/88

ISOLATES	DIARRHOEAL $n_1 = 196$		NON-DIARRHOEAL $n_2 = 269$		-Z VALUE	P-VALUE
	No.	%	No.	%		
Shigella Dysenteriae	20	10.2	17	6.3	1.528	0.0632
Shigella Flexineri	20	10.2	15	5.6	1.868	0.0309
Shigella Boydii	12	6.1	13	4.8	0.609	0.2713
Shigella Sonnei	2	1.0	7	2.6	1.223	0.1107
Campylobacter Jejuni	17	8.7	17	6.3	0.963	0.1678
Salmonella Species	4	2.0	5	1.9	0.141	0.444
ETEC	9	4.6	20	7.4	1.252	0.1053
EPEC	9	4.6	23	8.6	1.665	0.048
Aeromonas Hydrophilia	3	1.5	4	1.5	0.038	0.485
Negative	115	58.7	175	65.1	1.403	0.08

Table 4 VIRAL ISOLATES FROM DIARRHOEAL AND NON-DIARRHOEAL STOOLS
GOMOA ONYADZE/OTSEW JUKWA - 1987/88

ISOLATES	DIARRHOEAL $n_1 = 196$		NON-DIARRHOEAL $n_2 = 269$		Z-VALUE	P-VALUE
	No.	%	No.	%		
Rotavirus	13	6.6	3	1.1	3.223	0.0065
Cannot be determined by kit	5	3.1	7	2.6	0.296	0.3834
Negative	117	90.3	258	95.9	2.429	0.0076

Table 5 PARASITIC, BACTERIAL AND VIRAL ISOLATES FROM DIARRHOEAL AND NON-DIARRHOEAL STOOLS - GOMOA ONYADZE/OTSEW JUKWA - 1987/88

ISOLATES	DIARRHOEAL $n_1 = 196$		NON-DIARRHOEAL $n_2 = 269$		Z-VALUE	P-VALUE
	No.	%	No.	%		
Parasites + Bacteria	35	17.9	35	13.0	1.443	0.0745
Parasites + Rotavirus	5	2.6	0	0.0	2.634	0.0042
Parasites + Bacteria + Rotavirus	1	0.5	0	0.0	1.173	0.1204
Parasites	67	34.1	91	33.8	0.08	0.4682
Bacteria	82	41.8	96	35.7	1.347	0.09
Rotavirus	13	6.63	3	1.12	3.223	0.0063

Table 6 WEIGHT FOR LENGTH OR HEIGHT - PRESCHOOL CHILDREN IN TWO RURAL COMMUNITIES IN SOUTHER GHANA - MAY 1988

Age in Months	No. Exam.	Median & Above (A)		Median - 1SD (B)		Median - 2SD (C)		Median - 3SD (D)		Total Median - 2SD or Less (C & D)	
		No.	%	No.	%	No.	%	No.	%	No.	%
0 - 5.99	38	37	97.4	1	2.6	0	0	0	0	0	0
6 - 11.99	67	50	74.6	15	22.4	2	3.0	0	0	2	3.0
12 - 23.99	97	56	57.7	33	34.0	5	5.2	3	3.1	8	8.2
24 - 35.99	120	87	72.5	31	25.8	2	1.7	0	0	2	1.7
36 - 47.99	104	86	82.7	17	16.3	1	0.9	0	0	1	0.9
48 - 59.99	86	73	84.9	11	12.8	2	2.3	0	0	2	2.3
Total	512	389	76.0	108	21.1	12	2.3	3	0.6	15	2.9

A = 'Normal'

B = Possible Mild Protein energy malnutrition (Acute)

C = Moderate Protein Energy Malnutrition (Acute)

D = Severe Protein Energy Malnutrition (Acute)

SD = Standard Deviation.

Table 7 LENGTH OR HEIGHT FOR AGE - PRESCHOOL CHILDREN IN "C" RURAL COMMUNITIES IN SOUTHERN GHANA - MAY 1988

Age in Months		Median & Above (A)		Median - 1SD (B)		Median - 2SD (C)		Median - 3SD (D)		Total Median - 2SD or Less (C & D)	
		No.	%	No.	%	No.	%	No.	%	No.	%
0 - 5.99	38	20	52.6	10	26.3	3	7.9	5	13.2	8	21.1
6 - 11.99	67	32	47.8	22	32.8	8	11.9	5	7.5	13	19.4
12 - 23.99	97	34	35.1	42	43.3	15	15.5	6	6.2	21	21.6
24 - 35.99	120	47	39.2	47	39.2	19	15.8	7	5.8	26	21.7
36 - 47.99	104	21	20.2	41	39.4	31	29.8	11	10.6	42	40.4
48 - 59.99	86	20	23.3	40	34.9	26	30.2	10	11.6	36	41.9
Total	512	174	34.0	192	37.5	102	19.9	44	8.6	146	28.5

A = "Normal

B = Possible Mild undernutrition or stunting (Chronic)

C = Moderate undernutrition or stunting (Chronic)

D = Severe undernutrition (Dwarfing)

SD = Standard Deviation.

Table 8 WEIGHT FOR AGE - PRESCHOOL CHILDREN IN TWO RURAL COMMUNITIES IN SOUTHERN GHANA - MAY 1988

Age in Months	No. Exam.	Median & Above (A)		Median - 1SD (B)		Median - 2 SD (C)		Median - 3SD (D)		Total Median - 2SD or Less (C & D)	
		No.	%	No.	%	No.	%	No.	%	No.	%
0 - 5.99	38	27	71.1	7	18.4	4	10.5	0	0.0	4	10.5
6 - 11.9	67	24	35.8	25	37.3	13	19.4	5	7.5	18	26.9
12 - 23.99	97	30	30.9	42	43.3	18	18.6	7	7.2	25	25.8
24 - 35.99	120	45	37.5	47	39.2	22	18.3	6	5.0	28	23.3
36 - 47.99	104	41	39.4	41	39.4	18	17.3	4	3.8	22	21.2
48 - 59.99	86	29	33.7	43	50.0	13	15.1	1	1.2	14	16.3
Total	512	196	38.3	205	40.0	88	17.2	23	4.5	111	21.7

A = "Normal"

B = Possible Mild undernutrition (Acute or Chronic)

C = Moderate undernutrition (Acute Or chronic)

D = Severe undernutrition (Acute or Chronic)

SD = Standard Deviation.

Table 9 STANDARD DEVIATION SCORES OF WEIGHT FOR HEIGHT AND HEIGHT FOR AGE OF PRESCHOOL CHILDREN IN TWO RURAL COMMUNITIES IN SOUTHERN GHANA MAY 1988

Standard Deviation Score Weight for Height	Standard Deviation Score of Height for Age (per centage of population)			
	More than - 2.00	- 2.00 to - 2.99	- 3.00 to less	Total
More than - 2.00	69.4	19.3	8.4	97.1
- 2.00 to 2.99	1.6	0.5	0.2	2.3
- 3.00 or less	0.5	0.1	0.0	0.6
Total	71.5	19.9	8.6	100.0

TABLE 10

RECENT MALARIA INFECTION IN INFANTS
GOMOA FETTEH, GOMOA ONYADZE/OTSEW JUKWA 1988

Infection after Birth	Number Positive			%
	Onyadze	Fetteh	Total	
Less than 1 month	-	-	-	-
Between 1 & 2 months	5	2	7	8.2
Between 2 & 3 "	13	9	22	25.9
Between 3 & 4 "	9	6	15	17.6
Between 4 & 5 "	4	5	9	10.6
Greater than 5 "	9	23	32	37.7
Total	40	45	85	100%

Parasite Density - 45,000 - 80000/10000
without clinical malaria - (6)
Minimum age of first infection (6/52)(42 days). 1-2 months.

TABLE 11

Screening for In vivo Sensitivity of P. falciparum to chloroquine in schools at Nima, Madina and Gomoa Fetteh - 1988

Areas	No. Screened	No. with P. falciparum Infection	No. Urine Positive on Screening	No. Qualified For Study	No. Completed Study
Nima	506	91 (17.9%)	6	48	44
Madina	275	128 (46.5%)	1	59	59
Gomoa Fetteh	218	132 (60.6%)	7	49	41
Total	999	351 (35.1%)	14	156	144

TABLE 12

Parasite Density Counts of School Children in an In vivo P. falciparum sensitivity to chloquine Test in three areas in Southeren Ghana - 1988

Areas	Parasite Densities of Asexual Forms of P. falciparum per 8000WBCS							
	Day 0		Day 2		Day 4		Day 7	
	Arithmetic + Mean	* PDI	Arithmetic + Mean	* PDI	Arithmetic + Mean	* PDI	Arithmetic + Mean	* PDI
Nima	6543.4 ±2381.4	6.7	289.7 ± 215.1	1.5	41.3 ± 55.4	0.4	62.5 ± 69.6	0.5
Madina	7344.3 ±2667.6	6.7	351.8 ± 243.9	1.7	10.4 ± 10.5	0.1	48.4 ± 39.9	0.4
Gomoa Fetteh	9782.1 ±5824.5	5.9	1772.4 ±2542.2	1.6	60.5 ± 75.1	0.4	255.6 ± 256.9	0.4
Total	7766.2 ±2108.9	7.4	737.3 ± 735.1	1.7	34.1 ± 27.6	0.3	111.7 ± 78.6	0.6

*PDI - Bruce Chwatts Parasite Density Index

+ Mean ± SD at 95% CI.

TABLE 13

In vivo Sensitivity of P. falciparium Asexual Parasites to chloroquine in schools at Nima, Madina and Gomoa Fetteh - 1988

Areas	No. In Study	Grading of sensitivity								Total Resitance	
		S/RI		RI		RII		RIII			
		No.	%	No.	%	No.	%	No.	%	No.	%
Nima	44	34	77.3	1	2.3	9	20.4	0	0	10	22.7
Madina	59	48	81.4	3	5.1	8	13.5	0	0	11	18.6
Gomoa Fetteh	41	34	82.9	1	2.4	6	14.6	0	0	7	17.1
Total	144	116	80.6	5	3.5	23	15.9	0	0	28	19.4

TABLE 14

In vitro Susceptibility of P. falciparum Asexual Parasites to chloroquine in three areas in Southern Ghana - 1988

Areas	No. of Tests	No. Tests Successful		No. Sensitive	No. Resistance	Percentage of inhibition of Schizont Maturation in Concentration of chloroquine in pmol							
		No.	%			K(cont)	1	2	4	8	16	32	64
Nima	48	24	50.0	9	15	0	10.60	20.59	45.66	62.50	87.88	99.26	100
Madina	59	36	61.0	13	23	0	32.20	52.3	65.20	71.0	82.4	95.7	99.93
Gomoa Fetteh	49	32	65.3	16	16	0	28.44	59.14	79.8	86.15	92.48	96.95	98.41

TABLE 15

MEASLES IMMUNIZATION IN INFANTS 6.5-7.99 MONTHS SEROCONVERSION RATES IN TWO COMMUNITIES IN SOUTHERN GHANA - 1988

	No.	Rate
Seroconversion	43	81.1
Seronegative	4	7.5
Seropositive at the time of immunization	6	11.4
Total	53	100.00

1. Vaccine - Live Hyper attenuated measles vacc. (Schwarz Strain).

2. Seropositive - Haemagglutination - Inhibition (HI) Test showed antibody titre more than 1:8.

3. Seroconversion - Development of HI Titre 1:6 or more by Seronegatives.

INTRODUCTION

The Nutrition Unit became a separate unit of the Institute in 1986 has since then been carrying out Research as contained in the Tentative Implemention Programme for 1986 - 1991.

The following activities were carried out since 1986:

1. Technical training in blood, tissue and Food analysis.

2. Weaning Food and Oral Rehydration studies.

3. Vitamin A studies - from 1988 to present.

4. Nutritional survey

5. Iodine Deficiency studies from late 1988 to present.

1. TECHNICAL TRAINING:

This is being done both in Ghana and in Japan. In Ghana, training is on the job and materials (Food, blood and tissues) used in research serve as materials for training.

Training overseas at the expense of JICA is also being pursued. Mr. E. A. Addo, a senior technician returned to the unit from Japan in June 1988 after a year's studies. Miss J. Yartey and Mr. A. Bille both senior Research Assistants left for Japan and Indonesia respectively late 1988 to work for M.Sc degree. They would each be away for a year. Miss M. Armar, Research Fellow is currently pursuing studies for Ph.D degree in London.

Dr. E. E. K. Takyi, a senior Research Fellow and Acting Head of the unit returned to the unit on June 23rd after a 5-week tour of Japan. His tour was to afford him the chance to learn at first hand, the 'Administration' and Management of Research Programmes in Medical Institutions in Jpan. He also spent a week in the Laboratories of Professor Musushige, Tokyo Agricultural University, learning about the analysis of vitamins B1, B2 and C in plant and Animal tissues.

2. RESEARCH WORK:

According to WHO, there are 4 types of Malnutrition in Africa - these are:

i. Protein-Energy-Malnutrition (PEM)

ii. Vitamin A Deficiency

iii. Iodine Deficieny, and

iv. Iron Deficiency.

Our unit has started research to find solutions to the first 3 types of malnutrition, i.e. PEM, vitamin A deficiency and Iodine deficiency.

2.1. PEM - WEANING FOOD PROJECT:

2.1.1. Age Of Commencement Or Rejection Of Weaning Foods (Fortified And Non Fortified) By Ghanaian Babies

During our first study, we observed, that children who tended to refuse supplementary foods, even after the age of 12 months, were more prone to be breastfed for a long time. Since breastmilk output of mothers after 12 months of delivering might not be enough to cover a child's nutrient requirements, this inadequacy over a long period, could eventually lead to malnutrition.

The reason why some children refuse supplements even to the point of partial starvation, is not clear. We observed, that some children who started supplementation early, rejected it after a month or two. We wondered if the prolonged breastfeeding observed in our work, could be the result of this early rejection of supplements or whether it was to late introduction of supplemention, both of which could contribute to malnutrition.

We therefore investigated ages at which supplementation started and at which rejections were reported to have started through interviews. Two rural villages, one a fishing village and the other a farming village were used in these studies. Babies were recruited 2 weeks after birth or before introduction of supplementary foods.

They were visited every 2 weeks, the mothers interviewed and anthropometrio measurements of the babies, taken. On commencement of supplementation, each child was put on a ration chosen by the mother ie either 1. koko(non fortified) 2. koko + milk, 3. Weanimix - (both fortified) 4. or the fourth group which could vary its food at will. Suger (20g/day), Milk (10g/day) and weanimix (60g/day) were

provided according to dietary group. Unused rations of a week or more was used as indication of rejection in a subject.

RESULTS:

Results presented here are those of an initial number of 44 babies from the fishing village. 4 of the subjects were eliminated by the end of 1st month because of irregular attendance. The result of the farming village is not ready. The results indicate that children in this village were introduced to supplementary foods at the right age of 3 - 4 months (Tab. 1). The age at which rejection was reported to have started by most mothers, was the 5th month. The children were visited two weekly for about 8 months, however only the data for the first three months when they were not on adult foods are represented here.

During the 1st month, 5.5% of the koko group were reported to have rejected their supplements. By the second month the percentage had risen to 15.8, and were to be found in all four dietary group. In the third month rejection had risen to 22.2%. The results of this study indicate that children also start getting supplements early in this village. Late introduction of supplementary foods could therefore not be the cause of any subsequent prolongedg breastfeeding in this village. However as Table 2 indicates, rejection of supplements during the 5th and 6th months were reported to be 20% and 15% respectively. This shows that barely 2 months after being on supplementary foods, some children start rejecting them.

This observation is a bit disturbing because, most of the mother just accepted this rejection and would have subsequently given their babies only breastmilk, instead of trying other supplements. Another interesting observation was the few mothers who volunteered to join the fourth group which would varify the babies food. Most of the mothers preferred to give one type of supplement all the time if the baby would accept. This is also unfortunate. During the three months, the rejection rate in the 4th group was the least. However owing to the small number of babies in that group at a time, not much could be said about this.

17.5% of the subjects were reported to have shown no rejection through out the 3 months. This shows that most children might reject supplements at one time or the other. This rejection could take place during the early stages of supplementation. Mothers must be advised to take these early rejections seriously. They must be taught to excerise

patience and continue trying other supplements if a child refuses one type, instead of accepting the rejection and therefore giving the child only breastmilk. There will always be a number of healthy babies who might refuse to eat, irrespective of taste, aroma, or fortification as has been demonstrated in this work.

TABLE 1

% DISTRIBUTION OF AGES AT WHICH SUPPLEMENTATION STARTED IN SUBJECTS

AGE IN MONTHS	NUMBER OF SUBJECTS	%
1	8	18%
2	8	18%
3	13	30%
4	10	23%
5	1	2%
6	2	6%
7	1	2%
8	1	2%
12	44	100%

Four subjects were eliminated from the study by the end of the 4th study month.

TABLE 2

% DISTRIBUTION OF AGES AT REJECTION OF SUPPLEMENTS

AGE IN MONTHS	NUMBER OF SUBJECT	%
1	-	-
2	1	2.5
3	1	2.5
4	3	8.0
5	8	20.0
6	6	15.0
7	4	10.0
8	-	-
9	8	20
10	1	2.5
Above 10	1	2.5
No Rejections	7	17.5
n	40	100.0

TABLE 3:

TOTAL REJECTIONS PER MONTH

MONTH	NUMBER OF REJECTIONS	PERCENTAGE
1	2	5.5
2	6	15.8
3	8	22.2

2.2. ORAL REHYDRATION SALT STUDIES:

In association with the weaning food studies, we are conducting research into ORS in use in Ghana.

ORS are mixtures of glucose and common salt and some electrolytes in specific amounts which are used to replace lost fluid and electrolytes during diarrhoea.

2 research programmes are being carried out:

i. Quality control of UNICEF ORS sachets,

ii. Evaluation (Chemical analysis) of locally-used ORS.

2.2.1. QUALITY CONTROL OF UNICEF SACHETS:

It has been observed that some UNICEF ORS turn yellowish and lumpy after storage for 2 years or more. This is due to faulty sealing which allows moisture to enter the packet resulting in reaction between HCO_3 ions and glucose. The yellow colour and the lumpy nature of the salt-suger mixture makes the product less attractive, apart from the fact that there are marginal changes in the composition.

Samples more than 2 years old were anlaysed for glucose, sodium, potassium, chloride, bicarbonate and/or citrate levels. Glucose was analyzed using Somogyi-Nelson method; metals by Atomic Absorption Spectometry, chloride by argentometric titration and bicarbonate by difference ($Na^+ + K^+ - Cl^-$).

Results indicated that except in the case of highly coloured andlumped products, all the monitored samples had acceptable levels of constituents and therefore acceptable for use.

It was noticed that a trained person could base the acceptance or otherwise of an ORS sachet just by the colour of the product.

2.2.2. Evaluation (Chemical analysis) of Locally-Used ORS:

Our unit has been screening the various locally-used ORS to establish the scientific basis of their use.

The ORS analysed were kenkey water, Rice water and coconut juice. Analysis carried out wer: PH, glucose, total suger, sodium, Potassium and chloride. Total suger was determined by Anthrone methods. Other constituents were determined as in UNICEF ORS Analysis.

Results*

Sample	PH	Simple Suger (g/l)	Na^+ mmol/l	K^+ mmol/l	Cl^- mmol/l
Kenkey water	2.9 (2.6-3.4)	1.8 (0.4-5.6)	9.5 (4.3-18.5)	20.4 (10.2-37.3)	111.5 (44-220.0)
Coconut juice	4.7 (4.4-5.6)	46.1 (27.3-68.2)	0.3 (0.1-1.2)	73.6 (35.8-110.0)	64.6 (38.0-90.0)
Rice water	6.2 (5.0-6.7)	0.4 (0.3-0.6)	50.7 (14.3-62.6)	2.1 (1.2-4.6)	94.6 (87.0-106.0)
UNICEF ORS (acceptable limits)	7-8.8	20 (18.6-21.4)	89.5 (83.2-94.0)	20.1 (18.7-21.5)	80 (74.4-85.6)

Rice water: 100g rice in 1.5l water 5g salt-cooked for 40 minutes on gas stove
* At least 30 samples of each fluid analysed and averages found.

Discussion:

Results so far obtained indicated a need for slight adjustment of some of the chemical constituents (e.g. addition of a pinch of salt to coconut juice or addition of glucose to kenkey, etc) in order to bring them in line with UNICEF formulation. This must be investigated and tried in the field before adoption.

Future Work:

i. Adjustment of locally-used ORS to bring them to UNICEF Specification.

ii. Trial in PML Hospital along-side UNICEF ORS so as to assess their efficacy of rehydration in diarrhoea cases.

iii. Recommendation to the Ministry of Health for their adoption into the PHC system in the country or recommendation for their rejection.

2.3. VITAMIN A STUDIES:

Introduction

Vitamin A is one of the few Vitamins of which both deficiency and excess cause serious health hazards. Vitamin A deficiency is a nutritional disease, cuased by inadequate dietary intake of the Vitamin or its plant-based precursors and often aggravated by low absorption from the intestine.

Toxicity usually occurs as a result of abuse in Vitamin A supplementation and therapy.

At the moment, our unit is studying its deficiency since it is commoner than 'toxicity'. Vitamin A deficiency leads to Xerophthalmia (a term used all manifestations of vitamin A deficiency in the eye) as well as a number of diseased conditions, such as growth failures, impaired immune response with lowered resistance to infection, sterility, nervous breakdown and finally death.

Our unit has adopted a village, Gomoa Onyadze, a farming village in the Central Region, to study Vitamin A deficiency.

2.3.2. Aims:

i. To determine the serum vitamin A levels in the community to see if these levels conform to the WHO recommended levels.

ii. To find the cuase(s) of abnormalities, if any, and to attempt to remedy the situation.

2.3.3. METHODS:

2.3.3.1. Collection of Blood:

5ml of venous blood were collected from the superficial cubital and radial veins (in the arm) in the following groups of people.

i. 49 workers of NMIMR - Reference group

ii. 115 Inhabitants of Gomoa Onyadze, ranging in age from 1 to 40 years

2.3.3.2. Analysis of Serum Vitamin A

This was done using High Performance Liquid Chromatography (1).

2.3.3.3. Other Parameters:

Total protein, triglyceride, Urea Nitrogen, cholesterol and creatinine, were analysed using the Standard Methods of Analysis (2).

2.3.4. RESULTS AND DISCUSSIOS:

Results obtained are shown in tables 1 and 2 and in figures 1 & 2.

Results in table 1 indicated that except in the 0-4 year age group, the mean value for all the age groups were similar to the recommended value of 20-50 ug/dl serum. The mean values were - 18± 11.90, 31± 14.50, 48.3± 20.90 and 42.5± 18.70 for 0-4, 5-14, 15-30 and 31-40 year old groups, respectively.

Table 2 indicates results of other important physiological parameters that were monitored - in most cases, all the mean values were similar to the respective recommended levels. Fig. 1 shows the distribution pattern of vitamin A in the people studied. 6 people had levels which were extremely low - 10ug/dl, representing a group with a severe vitamin A deficiency. 20 people had levels in the range of 10-20ug/dl and are regarded as marginally deficient. 66 persons had acceptable levels of above 30ug/dl. Fig. 2 shows the percentage distribution of Vitamin A status in the various age groups. The results indicate that, based on an acceptable level, of 30 ug/dl, only about 15% of children

under 5 years had acceptable level, while in the case of 5-15 year old, about 50% had acceptable level. The values for 15-30 year old and those above 30 years were 80% and 65%, respectively.

The low levels of vitamin A in children below 5years, may at least in part, be due to the fact that these children are not normally fed substantially on foods containing adequate amounts of oils (eg. palm oil) or leafy vegetables (eg. Kontmire) which are the known sources of Vitamin A precursor (B carotene). These constitute the major sources of Vitamin A in the other age groups.

2.3.5. Vitamin A Supplementation:

Subjects with very low levels of vitamin A (8-15 ug/dl, n=20) were successively given 10,000 i.u. and 20,000 iu vitamin A capsules at 2 week interval, and serum levels monitored 2days later but there was no detectable rise. This shows that other factors apart from deficiency of vitamin A orits precursors in the diet could be a major cause of vitamin A deficiency in the subjects.

2.3.6. Future Work:

i. We plan to carry out a Nutritional survey in the inhabitants studied to find out the cause(s) of low levels of vitamin A, especially among the 1-4 year old age group.

ii. Once the cause(s) have been identifeid, these would be remedied and necessary advice given accordingly.

2.5. IODINE DEFICIENCY DISORDERS (IDD):

In collaboration with the Ministry of Health, Accra, our unit is seeking financial support from the International Davelopment Research Centre, Canada (IDRC) to phase-study the Prevalenc, etiology (Phase 1) and control (phase 2) of IDD in Ghana.

The project, estimated to cover about 100000 people in 70 Districts is expected to lastfor 4-5 years. Preliminary proposals have been submitted to IDRC for their reaction priorto submission of detailed proposals.

IDD is known to occur in moderate amounts in many parts of the country, from the Central to the Northern Region and

it has been identified to be the cause of many health problems, including retarded growth, malnutrition, abortion, still birth, mental retardation and low socio-economic output - according to November 1988 Joint FAO/WHO Report on Ghana National Food and Nutrition Policy and Plan of Action, 1989 - 1991.

PHASE 1: Prevalence and Etiology of IDD

This phase would last for 1 - 2 years.

General Objective: To determine the prevalence of IDD, assess thyroid status of the population and ascertain the causative factors that contribute to the endemia.

Specific Objectives:

1. To conduct a survey to determine the prevalence of goitre and other forms of IDD in rural and urban communities in Ghana.

2. To establish the biochemical parameters of thyroid function existing in the general population in the survey areas.

3. To determine urinary iodide, thiocyanate levels in the general population in the survey areas.

4. To ascertain the extent to which food consumption patterns contribute to the prevalence of IDD in the survey areas.

5. To screen and estimate the levels of goitrogens in local foods in survey areas.

6. To assess the relationship(s) between the prevalence of goitre (and other IDD) and the ionic content of water supplies.

PHASE 2: Control Phase:

This phase would only be commenced after the completion of phase 1 so as to know the prevalence rate and the target population which would be involved in the control phase. It would last up to 3 years.

General Objective:

To organize and implement an iodization programme in Ghana as an IDD control measure, with a view of recommending appropriate long term intervention measure for it eradication in Ghana.

Specific Objectives:

1. To set up a National Committee for the control of IDD (NCCIDD) and an IDD Control unit within the Primary Health Care Delivery System in Ghana.

2. To sensitize target population, health workers, and the general public on the importance of IDD control programme.

3. To conduct appropriate training activities for Medical and paramedical personnel in the management of IDD control programme in Ghana.

4. To administer iodized oil as an initial control measure to all needy people.

5. To monitor and assess the iodide status and thyroid function of the treated population, as indicators of the efficacy of IDD prophylaxis.

6. To set up salt-iodization plants at needy points as a long-term solution to IDD problem in needy areas in the country.

STAGE OF WORK:

1. At present, a methodology for the isolation of phenols and polyphenols from food samples is being worked out before being used for routine analysis in the main experiment.

2. Preliminary proposals have been submitted to IDRC for their reaction, prior to submission of detailed proposals.

3. IDRC is sending one of her staff members, Dr. Aidoo, to Ghana in August to hold discussions with the IDD project team. We plan that Dr. Aidoo visits also personnel of the Ministry of Health, Accra to indicate the Nation-wide importance of the project.

4. Detailed protocol has been submitted to the Scientific and Technical Committee of NMIMR for study and recommendations.

2.6. Collaborative Study On The Nutritional Status of Pre-school Children:

In collaboration with the Ministry of Health (Nutrition Division), 4 units of the NMIMR ie Nutrition, Epidemiology, Parasitology and Haematology have drawn up plans to initiate study into the Nutritional status of Pre-school children. Special attention is to be paid to the question of possible aggravation of nutritional status by parasitic agents.

In summary, 400 children in the 31st December Women's Movement Day Care Centre, near the Ministries, would be used for the study.

The following examinations/surveys would be made:-

1. Percentage of pre-school children who have been fully immunized against B.C.G, DPT, Polio, Measles, Yellow Fever.

2. Prevalence of PEM, Anaemia, Vitamins A, B1 and B2 deficiencies.

3. Anthropometric measurements.

4. Stool examination for ova, larva and worms.
   Remedial action(s) would be instituted as and when found necesary.

Stage of Work:

Donor Agencies (WHO, UNICEF) have pledged funds to the Ministry of Health for the start of the project, and it is expected that we shall start soon after the 10th anniversary celebrations of NMIMR.

Report by E.E.E. Takyi Ph.D.

NUTRITIONAL STATUS OF THE CHILDREN IN A RURAL COMMUNITY IN THE UPPER EAST REGION OF GHANA

INTRODUCTION AND BACKGROUND INFORMATION

Food situation in the Northern part of Ghana is widely recognized to be very poor and different from the Southern part. The higher incidence of Marasmus as compared to Kwashiorkor could be an indication of the generally poor food situation in the North. It is also believed that incidence of eye ailments in the South is less than in the North because of frequent use of foods rich in precursors of vitamin A in the South. Up to date, no reliable information has been gathered to support this assumption.

This field research was carried out to examine the nutritional status of the children in a typical village in the Upper East Region of Ghana. The parameters used for the determination of the nutritional status were food intake and anthropometry.

AIM

The main aim of this project is to obtain basal and reliable information about the nutritional status of children and factors contributing to malnutrition in the Upper East Region in particular, and the Northern part of the country in general.

OBJECTIVES

1. To determine dietary intake of the population in general and children aged between 1 and 12 years in particular.
2. To determine biochemical parameters of nutritional status from blood and urine samples in the same population
3. To determine anthropometric measurements of the population in general and children from 2 to 12 years in particular.
4. To determine the nutrient content of some local foodstuffs in order to assess nutrient intake.

METHODS

Location:

Binaba was chosen as a typical village in the Upper East Region. This village is located in the Zebilla District of the Upper East Region of Ghana and it is about 50 km east of Bolgatanga, the regional capital. The village is about five

kilometers square and has over two hundred houses. The inhabitants are predominantly Kusasis. The village has a Health Centre for the health needs of the people and those of the surrounding villages. Binaba Health Centre was chosen as the field research station to carry out anthropometric measurements and the accomodation of the investigators.

Dietary survey:

Twenty-seven (27) typical and cooperative families living around the field station were randomly selected. Daily dietary intake for 3 continuous days of all members of a family excluding breast-fed babies was recorded by an investigator staying in the selected house. Dietary recording of the selected families was carried out by 9 investigators, 3 from the Nutrition Unit of NMIMR and 6 nutrition field workers from the Centre.

Weights of all ingredients including water used for preparation of meals, together with the weights of prepared meals, were recorded. Dietary intake of each subject was measured as the difference between initial and final weight of every meal taken. Kitchen scales of 2 or 12 kg, depending upon the sample weight, were used for weighing each item.

Daily intake of each ingredient was calculated from the ratio in the cooked meal. For energy and nutrient intakes, the values from published food composition tables ("Food composition tables for use in Africa" published by U.S. Dept. Health, Education and Welfare and "Standard tables of food composition in Japan, 4th ed." edited by National Institute of Resources, Sciences and Technology Agency, Japan) were used.

Anthropometry:

Body weight and height; circumferences of chest, waist, upper-arm and head; tricep and sub-scapular skinfold thicknesses of children (2-12 years old) in this village and all subjects who participated in the dietary survey were measured.

Schedule

January	○	Field work for 5 days to collect back ground information. ↑ Demographical survey, ↓ Selection of subject.
February	○	Field work for 2 weeks.
March		↑ Dietary survey, | Anthropometry, ↓ Collection of food samples.
April	○	Data Analysis (Summary and evaluation).

May	↑ Nutrient intake,
June	| Anthropometry,
July	| Analysis of nutrient content of food samples.

RESULTS

Over 200 heads of families were interviewed for the collection of demographical information of the village. The summary of the Demographical data of Binaba obtained from questionaires is shown in tables 1-8. More than half of the households have between 5-10 members. About 43% of the population are aged 0-12 yrs, which is the target group of this study. Over 60% of the adult population of this village are small scale farmers. Illiteracy is also found to be very high, as shown in the tables.

Results of anthoropometry of randomly selected 101 children of 2-12 years old (who were also subjects for the dietary survey) are shown in Table 9. Mean body weight and height of these children were found to be about 80% and 90% of Harvard (for 2-5 years) or Iowa (6-12 years) Standards respectively. Similar low values were obtained in other anthropometric parameters. Results of the dietary survey of 189 subjects are shown in tables 10-15. Mean energy intakes for all the age groups did not vary much, being about 1200-1600 kcal/day, which is about 40-70% of RDA (Recomended Dietary Allowance published by FAO/WHO, 1973). Mean protein intakes were 40-50 g/day. For the 4-12 years old, it forms over 90% of RDA, while it is about 60-90% RDA for the above 13 years old age groups. Millet, the staple food of this region, contributed about half of the total amount of protein consumed, while the animal protein portion was only about 5%. Iron intake was comparable to the RDA. Calcium intake was low, being about half of the RDA. Thiamin intake was comperable to the RDA. Riboflavin intakes were low, being about half of the RDAs. Wide individual variations of retinal intakes were observed among the subjects.

Analysis of the local foodstuffs for their nutrients contents are in progress. Further assessment of nutritional status by the biochemical analysis of blood and urine constituents will be carried out between August and October.

DISCUSSION

Undernourishment, especially of children is a common problem in developing countries. Since the severe forms of protein-energy malnutrition (PEM)- Marasmus and kwashiorkor, are widespread in Ghana, subclinical cases of malnutrition,

which are not easily identifiable, must be common. Results of this survey confirmed that energy and most of the nutrient intakes were below RDAs. Although the amount of protein consumed was comparable to RDA, the quality is very poor. Ingested protein therefore cannot be fully utilized to maintain proper growth under insufficient energy intake, as observed to the low anthropometric measurements. Low energy and nutrient intakes are an indication of the poor dietary situation in northern part of Ghana.

A favourable observation made during our stay was the frequent use of leaves (fresh ones in the rainy season and dry ones in the dry season), groundnuts and melon seeds. Wide variations were observed in vitamin intakes, especially vitamin A, being high in these who consumed more green leafy vegetables. Since these leaves are available and easily obtainable, their increased consumption could improve the mineral and vitamin status.

Generally speaking, improvement of nutritional status results from an improved dietary intake, which is directly related to food availability. However, dietary intake is influenced not only by food availability itself but also by other factors such as socio-economic and nutritional knowledge. Our dietary survey undertaken in Southern Ghana, where food situation is not so bad, showed that the most effective means of improving the nutritional status of the children is nutrition education of their mothers. Results from this survey however, indicate that it is increased food availability in the north. The probable cause of higher incidence of Marasmus in pre-school children in northern Ghana, when compared to their southern counterparts, may be due to the inadequate food intake during the lean seasons. Nutrition education alone will thus not be enough to solve the nutrition problems in the Northern Region and the Upper Regions of this country. It means that current dietary intake in each region together with environmental factors influencing it must be determined in order to set up the policy for the improvement of nutritional status in the particular region of the counry. There are several other factors like weather condition, soil composition, water and so forth which contribute towards the yield perseason.
Appropriate simpe agricultural practices and methods aimed at increasing food production and storage should therefore be introduced and sustained in the northern part of the country.

Table 1. Number of persons per household in Binaba

No. of persons	No. of households	%
1	1	0.4
2	5	1.9
3	10	3.8
4	20	7.6
5	30	11.5
6	29	11.1
7	25	9.6
8	25	9.6
9	23	8.8
10	10	3.8
11-15	43	16.5
16-20	25	9.6
21-30	12	4.6
31-40	2	0.8
41-50	1	0.4
Total	261	100.0

Total number of households = 261
Total number of houses = 217

Table 2. Age distribution in Binaba

Age	M	F	Total	%
(Months)				
0- 5	22	20	42	1.7
6-11	11	21	32	1.3
12-23 (1yr)	31	38	69	2.7
24-35 (2yrs)	39	46	85	3.4
36-47 (3yrs)	47	59	106	4.2
48-59 (4yrs)	40	53	93	3.7
60-71 (5yrs)	53	43	96	3.8
(years)				
6-12	282	283	565	22.4
13-19	173	134	307	12.2
20-24	80	97	177	7.0
25-29	77	106	183	7.2
30-39	121	158	279	11.1
40-49	72	120	192	7.6
50+	137	158	295	11.7
Total	1186	1336	2521	100.0
(%)	(47.0)	(53.0)	(100.0)	

Table 3. Occupational distribution in Binaba

	Men		Women	
	No.	%	No.	%
Small scale farmers	479	79.7	484	60.7
Large scale farmers	1	0.2	-	-
Petty traders	28	4.7	224	28.1
Teachers	20	3.3	9	1.1
Artisans	14	2.3	6	0.8
Fishermen (of fish ponds)	4	0.7	-	-
Drivers	4	0.7	-	-
Housewives	-	-	73	9.1
Herdsmen & poultry farmers	8	1.3	-	-
Girl servants	12	2.0	1	0.1
Watchmen	11	1.8	-	-
Others eg. labourers Soothsayers etc.	20	3.3	1	0.1
Total	601	100.0	798	100.0

Table 4. Occupational problems of Binaba

Problems	No.	%
1. Financial*	85	31.6
2. Insufficient rainfall	88	32.7
3. Lack of farm inputs		
a. Fertilizer	15	5.6
b. Bullocks	2	0.7
c. Seeds	1	0.4
d. Implements	4	1.5
4. None	4	1.5
5. No answer	70	26.0
Total	269	100.0

* Finantial problems:
  a) No money for the following
     i) Extention of farms
     ii) Hiring of labour
     iii) Farm inputs
  b) And can't obtain loans from the banks

Table 5. level of education (13 years & above) in Binaba

Level of education	Men		Women	
	No.	%	No.	%
Nil	253	68.9	377	92.6
Primary school	46	12.5	10	2.4
Middle school	36	9.8	14	3.4
Junior secondary school	7	1.9	3	0.7
Secondary school	12	3.3	1	0.3
Vocational school	4	1.1	1	0.3
Technical school, training school and university	9	2.5	1	0.3
Total	367	100.0	407	100.0

Table 6. Level of education of children aged 6-12 years in Binaba

Level of education	Men		Women	
	No.	%	No.	%
Nil	95	64.2	103	71.0
Primary school	50	33.8	39	26.9
Junior secondary school	3	2.0	3	2.1
Total	148	100.0	145	100.0

Table 7. Level of education of inhabitants aged above 6 years in Binaba

Level of education	Men		Women	
	No.	%	No.	%
Nil	348	67.6	480	86.9
Primary school	96	18.6	49	8.9
Middle school	36	7.0	14	2.5
Junior secondary school	10	1.9	6	1.1
Secondary school	12	2.3	1	0.2
Vocational school	4	0.8	1	0.2
Higher institutions	9	1.8	1	0.2
Total	515	100.0	552	100.0

Table 8. Religion of inhabitants aged above 6 years in Binaba

Religion	Men		Women		Both sexes	
	No.	%	No.	%	No.	%
Pagan	748	80.5	900	85.5	1648	83.2
Christian	118	12.7	91	8.7	209	10.6
Moslem	46	5.0	46	4.4	92	4.6
None	17	1.8	15	1.4	32	1.6
Total	929	100.0	1052	100.0	1981	100.0

TABLE 9.

SUMMARY OF ANTHROPOMETRY

Age Group	(No)	Age mean	Body Weight (kg)	Height (cm)	Circumference				Skinfold Thickness	
					Head (cm)	Chest (cm)	Waist (cm)	Upper Arm (cm)	Triceps (mm)	Subscapular (mm)
24-35M Mo	(5)	30± 3	10.4± 1.4	81.9± 4.3	46.4± 1.0	47.2± 1.0	50.3± 3.2	14.9± 1.4	8.0± 2.5	6.0± 1.9
24-35F Mo	(7)	30± 3	10.3± 1.9	84.8± 5.6	45.8± 0.6	46.6± 3.6	48.4± 3.9	14.2± 1.4	8.7± 3.0	5.7± 0.8
36-47M Mo	(7)	39± 3	12.5± 1.3	89.6± 4.6	47.3± 0.3	48.8± 1.7	52.7± 3.5	15.0± 0.6	8.3± 1.8	6.7± 2.6
36-47F Mo	(8)	41± 4	11.8± 2.3	89.0± 5.8	-	-	52.5± 2.1	14.9± 1.5	9.9± 2.6	6.8± 2.5
48-59M Mo	(4)	49± 1	12.4± 2.2	94.1± 8.3	-	-	51.1± 1.7	14.4± 1.6	7.3± 2.2	5.5± 2.9
48-59F Mo	(4)	49± 1	13.9± 3.2	93.6± 7.7	-	-	55.9± 2.6	15.5± 1.0	10.8± 2.4	8.0± 1.8
5M Yr	(8)	5± 0	17.8± 3.0	108.2 ± 7.4	-	-	57.2± 2.4	15.7± 1.3	6.9± 2.4	6.0± 1.9
5F Yr	(5)	5± 0	15.6± 3.9	103.8 ±10.1	-	-	54.0± 5.0	15.5± 1.7	7.6± 2.1	5.4± 1.5
6M Yr	(5)	6± 0	16.9± 2.2	108.4 ± 6.4	-	-	54.5± 1.1	15.0± 1.8	6.4± 1.1	4.6± 1.3
6F Yr	(5)	6± 0	16.3± 1.6	107.7 ± 3.3	-	-	55.4± 2.0	15.4± 0.9	7.6± 1.3	6.4± 1.1
7M Yr	(6)	7± 0	20.1± 2.8	117.7 ± 7.8	-	-	57.6± 3.2	16.1± 0.7	5.7± 1.6	5.2± 1.2
7F Yr	(2)	7± 0	19.5± 2.8	115.9 ± 8.8	-	-	57.9± 1.2	16.8± 1.1	9.0± 2.8	8.5± 3.5
8M Yr	(2)	8± 0	22.0± 3.5	121.8 ± 8.6	-	-	56.5± 0.7	16.5± 0.7	6.0± 1.4	5.5± 2.1
8F Yr	(6)	8± 0	21.4± 4.0	122.2 ± 9.3	-	-	57.4± 9.4	17.1± 1.6	6.5± 2.3	6.0± 1.9
9M Yr	(3)	9± 0	23.2± 1.8	127.4 ± 5.8	-	-	58.5± 1.9	17.1± 0.5	6.3± 2.5	5.7± 2.1
9F Yr	(1)	9	27.0	124.7	-	-	62.8	20.5	13.0	11.0
10M Yr	(5)	10± 0	26.6± 1.9	135.0 ± 3.6	-	-	61.3± 2.7	16.9± 1.9	6.4± 2.3	5.2± 1.3
10F Yr	(4)	10± 0	22.8± 2.9	129.5 ± 3.3	-	-	58.2± 2.7	17.6± 1.5	6.8± 2.2	5.3± 2.5
11M Yr	(3)	11± 0	25.2± 3.0	129.4 ± 5.7	-	-	59.5± 3.2	16.8± 1.1	4.7± 2.1	5.0± 1.0
11F Yr	(2)	11± 0	31.5± 2.8	142.8 ± 4.0	-	-	62.5± 1.3	19.3± 0.4	4.5± 2.1	5.0± 1.4
12M Yr	(4)	12± 0	33.6± 6.1	141.9 ±10.0	-	-	63.7± 6.2	17.7± 4.0	7.3± 1.7	7.5± 2.6
12F Yr	(5)	12± 0	31.9± 6.2	140.9 ± 5.3	-	-	63.6± 1.4	19.8± 1.9	8.0± 1.6	6.6± 1.5
13-15M Yr	(4)	14± 1	28.5± 4.9	138.2 ± 6.0	-	-	59.8± 4.2	18.2± 1.7	6.0± 2.4	4.5± 1.7
13-15F Yr	(7)	14± 1	45.7±11.5	155.7 ± 7.4	-	-	64.0± 5.4	23.3± 2.6	10.1± 7.0	9.6± 4.2
16-18M Yr	(5)	16± 1	36.0±11.5	149.4 ± 8.1	-	-	68.3± 7.3	19.7± 2.8	5.0± 1.6	6.8± 1.8
16-18F Yr	(3)	17± 1	45.2±22.2	144.8 ±26.3	-	-	-	29.6± 6.8	15.7± 9.0	14.7± 8.0
19-21M Yr	(1)	20	42.0	151.1	-	-	67.2	22.7	7.0	8.0
19-21F Yr	(1)	20	45.0	161.6	-	-	-	24.1	7.0	7.0
22-29M Yr	(7)	26± 2	58.9± 4.9	170.8 ± 5.9	-	-	-	27.3± 1.0	6.6± 1.5	9.0± 1.6
22-29F Yr	(15)	25± 2	52.8± 4.3	161.9 ± 5.0	-	-	-	26.0± 1.6	10.9± 3.4	11.9± 2.8
30-39M Yr	(9)	35± 3	57.4± 5.5	171.6 ± 6.5	-	-	-	27.1± 2.6	6.1± 3.4	10.3± 4.6
30-39F Yr	(17)	33± 2	56.0±10.8	160.7 ± 7.6	-	-	-	27.1± 3.5	13.0± 9.1	13.4± 9.8
40-49M Yr	(4)	46± 3	53.5± 9.6	166.1 ± 4.6	-	-	-	25.1± 3.3	3.5± 0.6	8.0± 2.4
40-49F Yr	(9)	44± 4	47.9± 7.7	158.7 ± 8.3	-	-	-	25.9± 2.9	8.3± 5.1	9.4± 4.3
50-59M Yr	(5)	52± 3	57.1± 9.7	166.6 ± 8.7	-	-	-	26.6± 3.3	4.6± 1.5	9.2± 0.8
50-59F Yr	(6)	52± 2	43.9± 5.7	155.3 ± 1.7	-	-	-	24.7± 2.0	9.7± 5.0	8.8± 3.9
60-69M Yr	(1)	62	49.0	165.2	-	-	-	24.3	4.0	7.0
60-69F Yr	(1)	65	46.5	150.6	-	-	-	26.2	12.0	10.0
70-79M Yr	(1)	71	57.0	179.1	-	-	-	24.4	7.0	8.0
70-79F Yr	(2)	71± 1	40.5± 4.9	149.2 ± 5.4	-	-	-	25.0± 1.1	7.5± 0.7	7.5± 2.1
80-89M Yr	(2)	82± 3	47.8± 4.6	168.7 ± 6.9	-	-	-	23.8± 1.1	4.0± 0.0	7.0± 0.0
80-89F Yr	(1)	85	36.0	159.2	-	-	-	22.3	9.0	7.0

Table 10. ENERGY INTAKE

AGE GROUP (Yrs)	No.	TOTAL ENERGY (kcal)	%RDA	MILLET ENERGY (kcal)	%RDA	%TOTAL
4- 6	(34)	1289 ±427	70	770±375	42	61
7- 9	(21)	1425 ±402	65	857±307	39	61
10-12M	(13)	1344 ±321	52	843±240	32	63
10-12F	(11)	1369 ±379	58	743±396	32	56
13-15M	(4)	1266 ±598	44	912±578	32	72
13-15F	(8)	1639 ±571	66	869±583	35	53
16-19M	(6)	1448 ±548	47	854±512	28	59
16-19F	(3)	1393 ±422	60	683±282	29	49
20' M	(32)	1526 ±532	51	959±469	32	63
20' F	(57)	1285 ±523	58	792±494	36	62

Table 11. PROTEIN INTAKE

AGE GRP (Yrs)	No.	TOTAL PROT. (g)	RDA	%RDA	ANIMAL (g)	%TOTAL	MILLET (g)	%TOTAL
4- 6	(34)	43.3 ±17.1	34	127	3.5 ±5.4	5.6±9.2	22.9 ±13	53.5±18.9
7- 9	(21)	46.9 ±16.0	41	114	2.9 ±3.4	5.6±6.5	25.2 ± 9	54.4±16.0
10-12M	(13)	43.1 ±10.3	50	86	2.7 ±2.5	6.9±7.9	23.9 ± 8	55.6±14.5
10-12F	(11)	45.2 ±10.4	48	94	2.1 ±2.3	4.5±4.8	22.3 ±13	49.8±22.1
13-15M	(4)	39.3 ±16.7	62	63	2.2 ±1.4	7.5±6.5	23.5 ± 8	59.7±20.8
13-15F	(8)	49.5 ±19.3	52	95	2.3 ±3.2	3.8±4.6	25.4 ±14	51.4±27.7
16-19M	(6)	47.9 ±19.9	63	76	3.1 ±3.4	6.0±5.3	26.1 ± 5	54.4±10.6
16-19F	(3)	45.6 ± 6.5	50	91	1.6 ±1.4	3.4±2.9	19.7 ± 6	43.3±12.1
20' M	(32)	50.5 ±18.0	62	81	4.9 ±6.0	8.7±9.0	28.1 ±13	55.3±23.9
20' F	(57)	41.7 ±17.1	48	87	2.5 ±5.4	5.0±6.6	22.8 ±14	54.9±23.6

Table 12. MINERAL INTAKE

AGE GRP (Yrs)	No.	CALCIUM mg	RDA	%RDA	IRON mg	RDA	%RDA
4- 6	(34)	329±297	450	73	18± 7	10	180
7- 9	(21)	394±291	450	88	20±12	10	200
10-12M	(13)	288±221	650	44	20± 8	10	200
10-12F	(11)	341±222	650	52	19± 8	24	79
13-15M	(4)	342±414	650	53	12± 7	18	67
13-15F	(8)	527±426	650	81	21±10	24	88
16-19M	(6)	320±189	550	58	21±10	9	230
16-19F	(3)	341±176	550	62	21± 2	28	75
20' M	(32)	346±350	450	77	20±10	9	222
20' F	(57)	324±236	450	72	16± 9	28	57

Table 13. VITAMIN INTAKE (1)

AGE GRP (Yrs)	No.	B_1 mg	B_1 RDA	B_1 %RDA	B_2 mg	B_2 RDA	B_2 %RDA
4- 6	(34)	1.08±0.43	0.7	154	0.41±0.15	1.1	37
7- 9	(21)	1.13±0.37	0.9	126	0.42±0.15	1.3	32
10-12M	(13)	1.27±0.60	1.0	127	0.46±0.22	1.6	29
10-12F	(11)	1.10±0.30	0.9	122	0.43±0.12	1.4	31
13-15M	(4)	0.89±0.56	1.2	74	0.34±0.13	1.7	20
13-15F	(8)	1.10±0.32	0.9	122	0.41±0.16	1.5	27
16-19M	(6)	1.09±0.64	1.2	91	0.40±0.16	1.8	22
16-19F	(3)	1.25±0.25	1.0	125	0.41±0.12	1.4	29
20* M	(32)	1.34±1.30	1.2	112	0.49±0.19	1.8	27
20* F	(57)	1.02±0.47	0.9	113	0.38±0.70	1.3	29

Table 14. VITAMIN INTAKE (2)

AGE GRP (Yrs)	No.	NIACIN mg	NIACIN RDA	NIACIN %RDA	C mg	C RDA	C %RDA
4- 6	(34)	10.3±4.6	12.1	85	11.2± 9.4	20	56
7- 9	(21)	10.3±3.5	14.5	71	11.4±10.9	20	57
10-12M	(13)	10.6±3.3	17.2	62	12.5± 7.8	20	63
10-12F	(11)	10.1±2.8	15.5	65	9.5±11.3	20	48
13-15M	(4)	7.9±4.1	19.1	41	18.9±23.4	30	63
13-15F	(8)	10.3±4.4	16.4	63	14.1±16.2	30	47
16-19M	(6)	11.9±5.1	20.3	59	19.0±16.7	30	63
16-19F	(3)	11.2±2.9	15.2	74	11.0±11.3	30	37
20* M	(32)	11.2±5.3	19.8	57	10.9±10.7	30	36
20* F	(57)	8.8±4.5	14.5	61	7.9± 8.2	30	26

Table 15. VITAMIN INTAKE (3)

AGE GRP (Yrs)	No.	VITAMIN A I.U.	VITAMIN A RDA	VITAMIN A %RDA
4- 6	(34)	628 ±494	500	126
7- 9	(21)	591 ±598	667	89
10-12M	(13)	384 ±196	958	40
10-12F	(11)	675 ±707	958	70
13-15M	(4)	448 ±407	1208	37
13-15F	(8)	549 ±781	1208	45
16-19M	(6)	477 ±248	1250	38
16-19F	(3)	1198 ±876	1250	96
20* M	(32)	529 ±439	1250	42
20* F	(57)	452 ±528	1250	36

MAJOR CAUSES OF CHILDHOOD MORBIDITY

GÜMOA FETTEH – JULY 1988–JUNE 198[illegible]

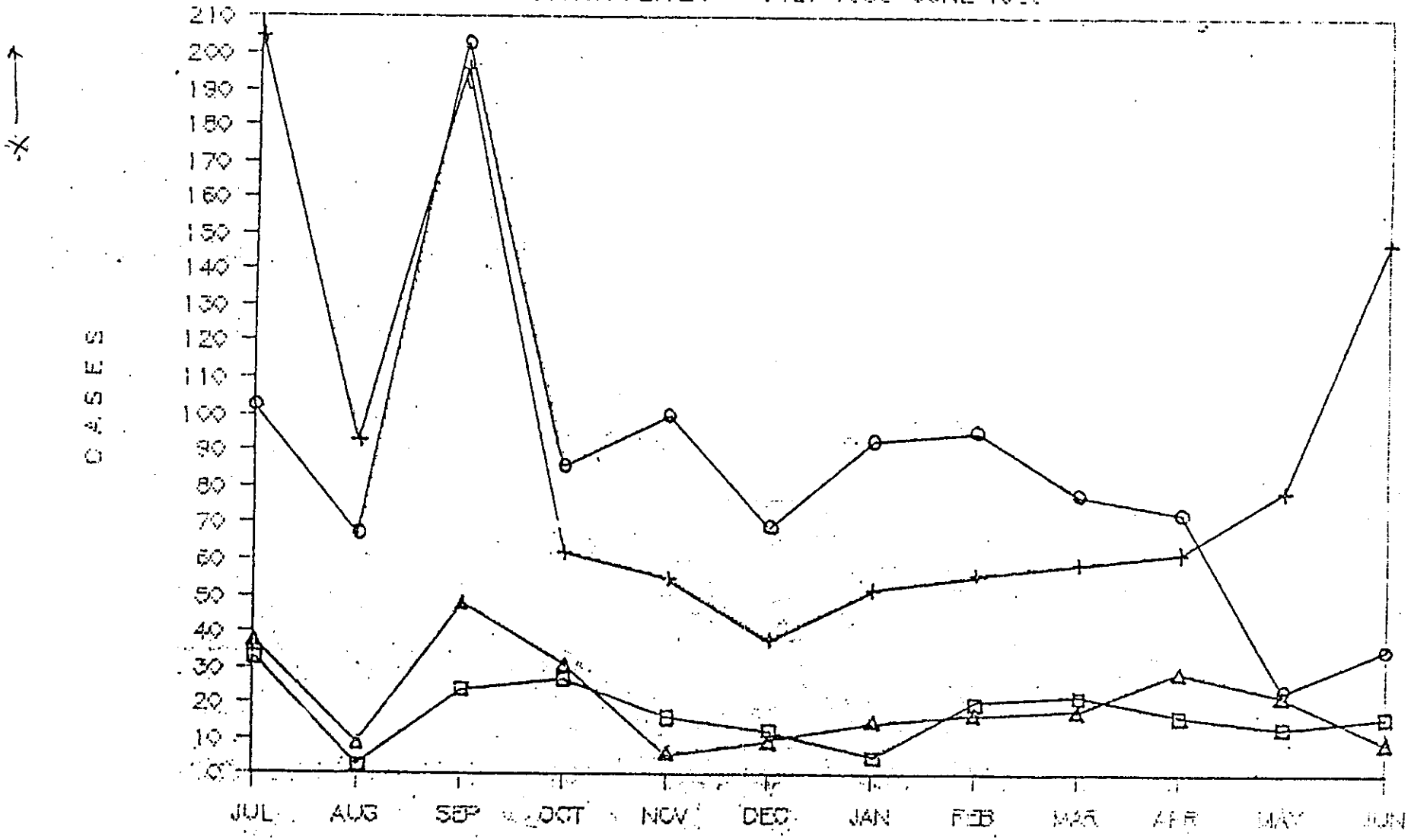

Fig. 2

MAJOR CAUSES OF CHILDHOOD MORBIDITY

GOMOA ONYADZE/OTSEW JUKWA JULY 1988 - JUNE 1989

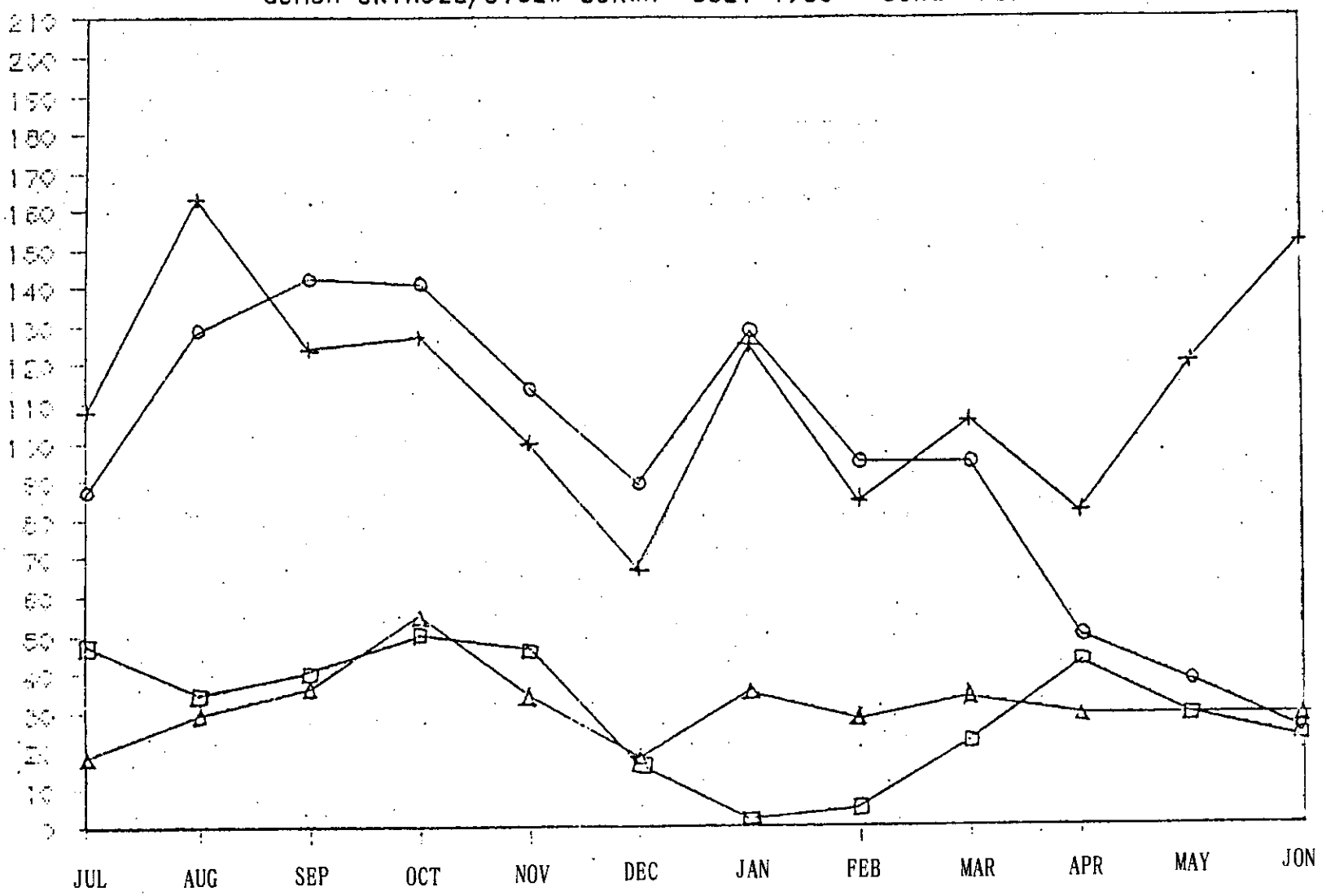

Fig. 3

MAJOR CAUSES OF CHILDHOOD MORBIDITY

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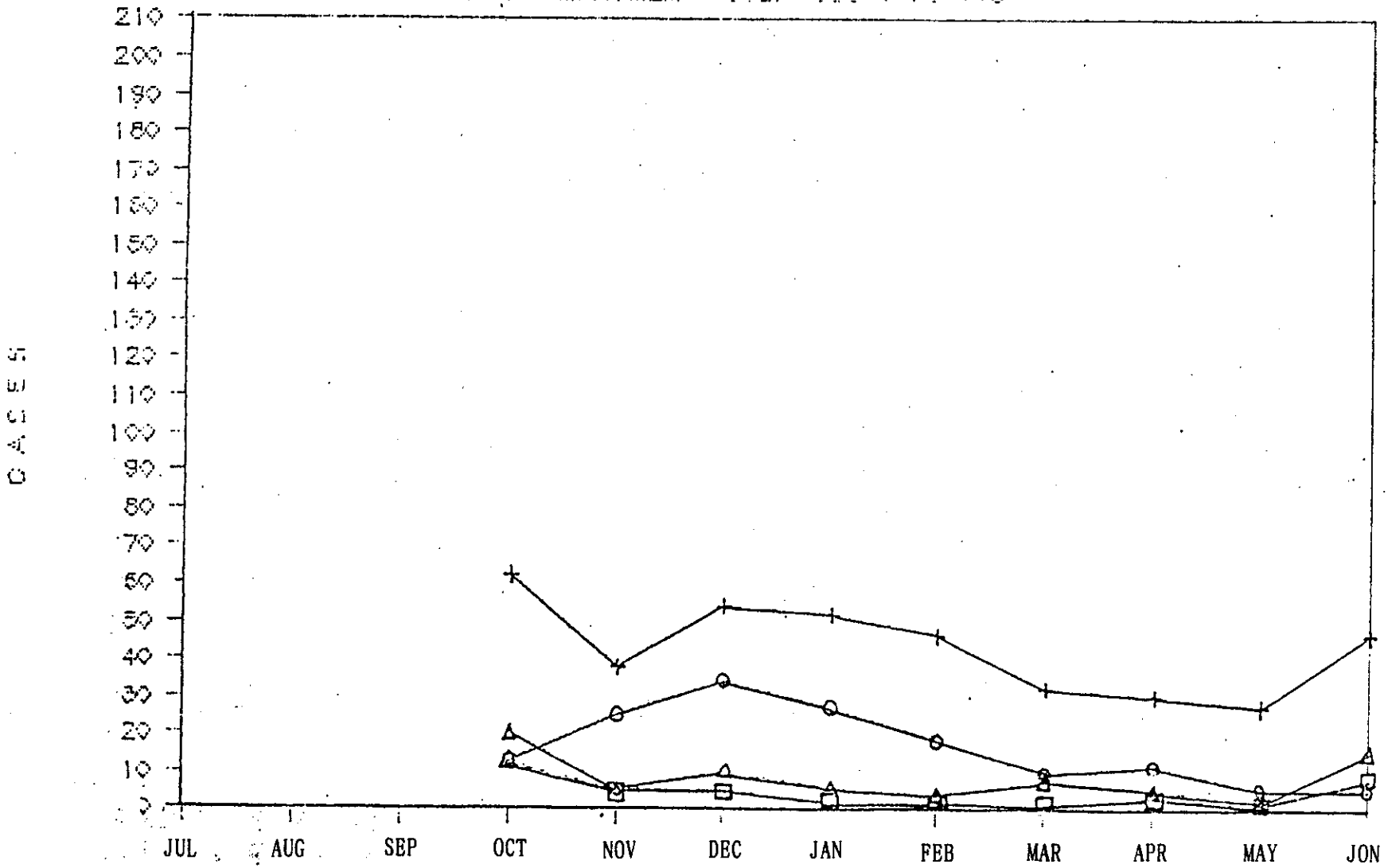

□ SKIN DISEASE + MALARIA ○ A. R. I △

Table. I VITAMIN A, TRIGLYCERIDE AND PROTEIN LEVELS IN VARIOUS AGE GROUPS

Age (years)	Vitamin A (µg/dl ± S.D)	Triglyceride (mg/dl)	Protein (mg/dl ± S.D)	No of Subjects
0 – 4	18·0 ± 11·90	124·5 ± 70·00	7·1 ± 0·70	20
5 – 14	31·0 ± 14·50	77·0 ± 52·70	7·0 ± 0·84	40
15 – 30	48·3 ± 20·90	93·3 ± 53·30	7·5 ± 0·81	32
31 – 40	42·5 ± 18·70	115·8 ± 55·80	7·3 ± 0·77	23
Reference Group (NMIMR)	40·1 ± 17·0	107·6 ± 38·8	8·14 ± 0·89	49
Recommended Level (WHO)	20 – 50	30 – 130	6·7 – 8·3	—

Table 2 SERUM PROFILE

Age (years)	Urea Nitrogen (mg%/dl)	Total Cholesterol (mg%/dl)	Creatinine (mg/dl)	No of Subjects
0 – 4	5·5 ± 2	106·8 ± 18·7	0·45 ± 0·18	20
5 – 14	7·8 ± 3·2	110·7 ± 25·5	0·57 ± 0·21	40
15 – 30	8·0 ± 3·1	134·3 ± 27·0	0·71 ± 0·32	32
31 – 40	7·2 ± 2·3	134·5 ± 23·0	0·86 ± 0·41	23
Reference Group	7·5 ± 2·2	153·0 ± 36·6	1·12 ± 0·23	49
Recommended Level (WHO)	8 – 20	130·0 ± 25·0	0·6 – 1·2	—

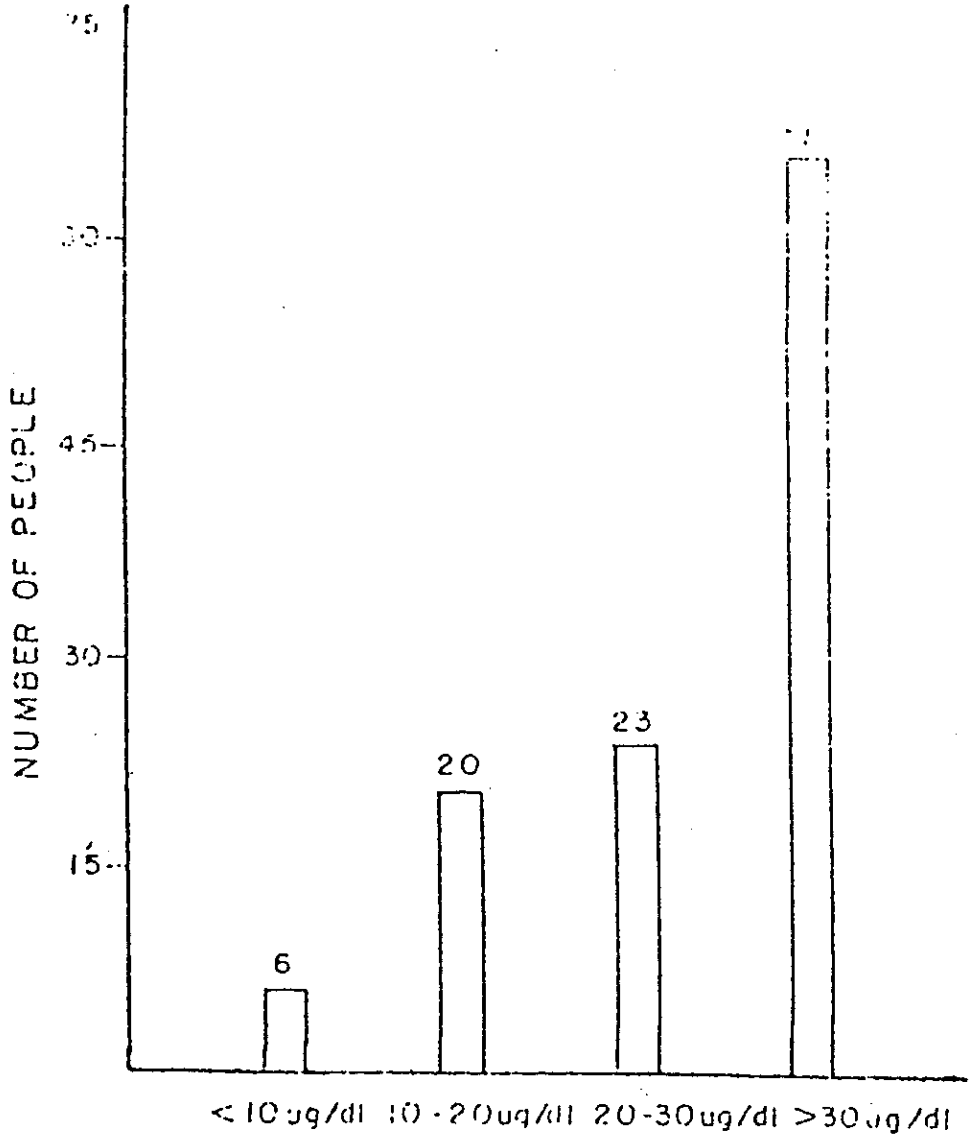

FIG. DISTRIBUTION PATTERN OF VITAMIN A

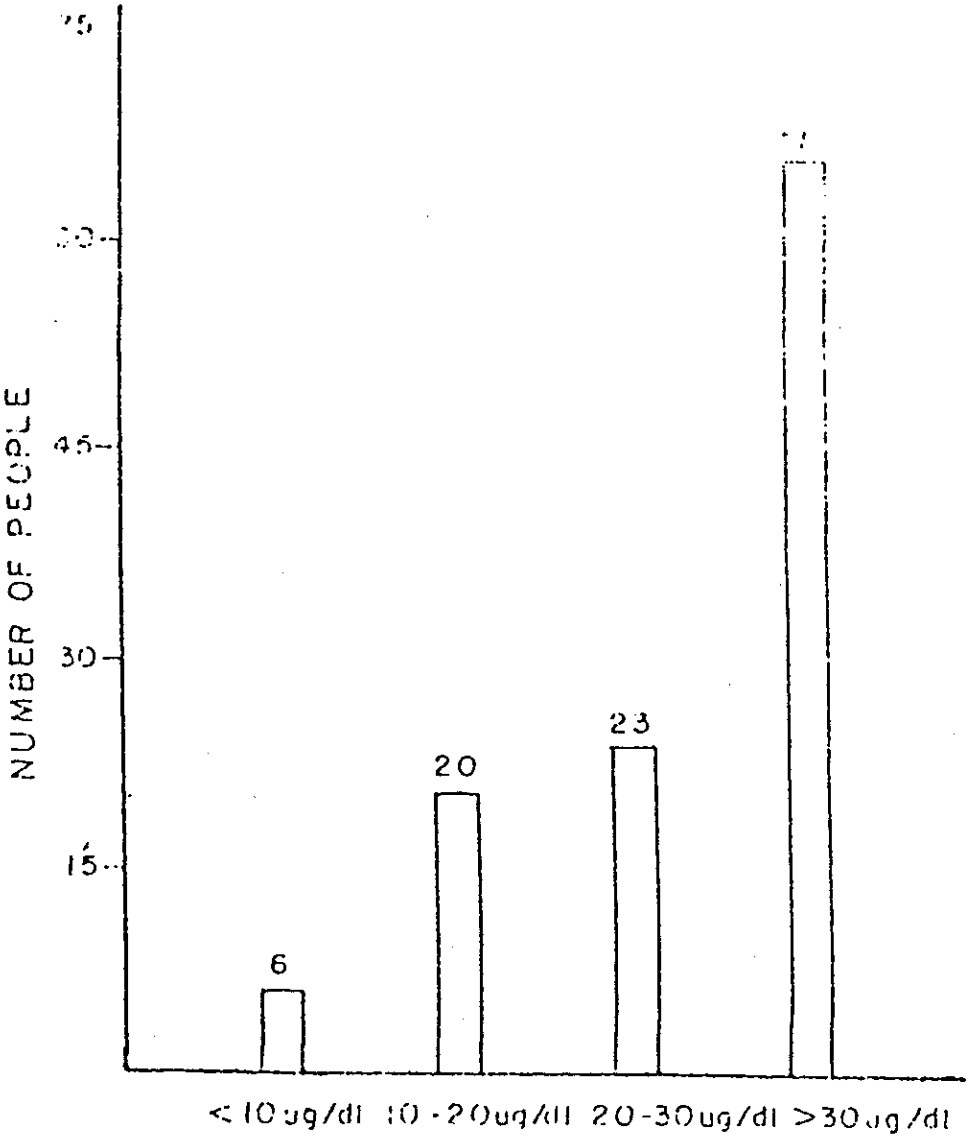

FIG. 1 DISTRIBUTION PATTERN OF VITAMIN A

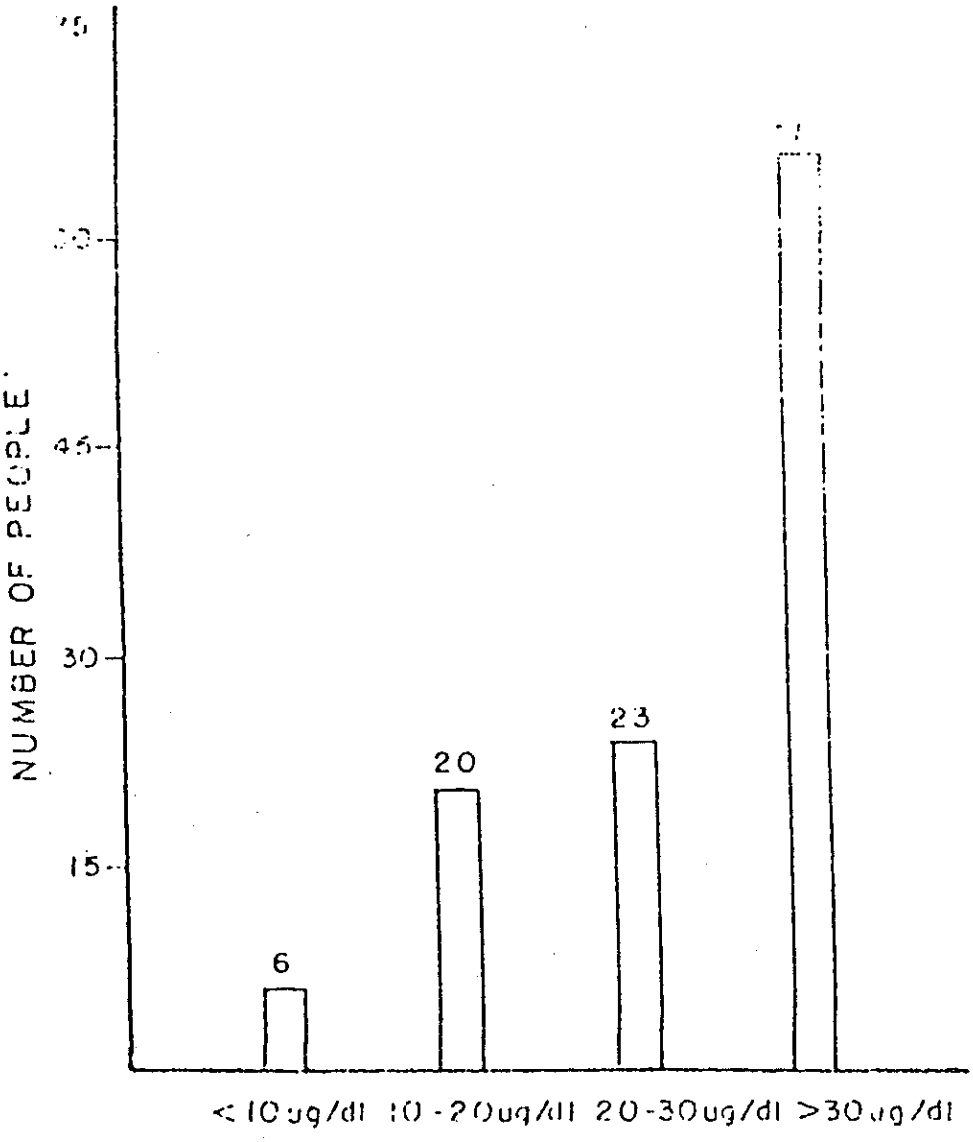

FIG. 1 DISTRIBUTION PATTERN OF VITAMIN A

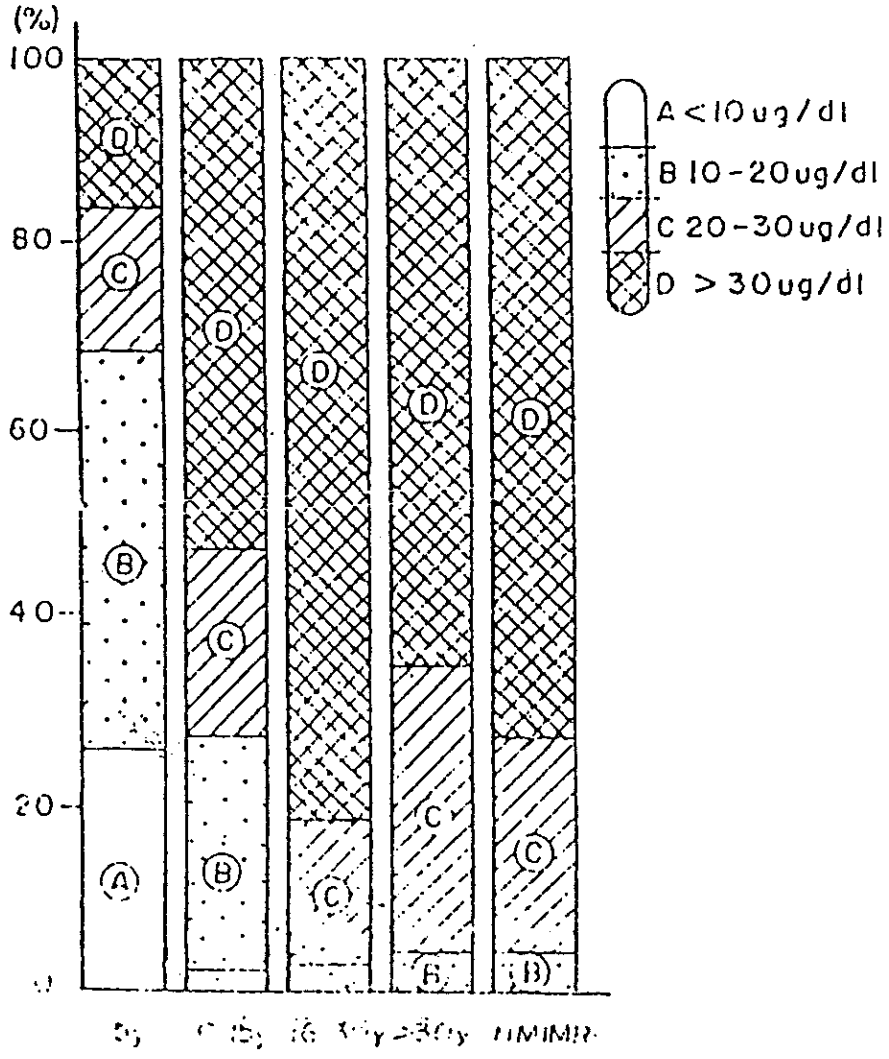

Fig 2 VITAMIN A STATUS IN THE VARIOUS AGE GROUPS

II In relation to the Polio Project it was also agreed that:

(i) The Noguchi Memorial Institute for Medical Research will collaborate with Expanded Programme on Immunization, WHO on Polio Vaccine Efficacy studies.

(ii) The details of the implementation plan will be worked out by the virology, epidemiology, and other units concerned.

11/08/89 11/08/89