第三国集団研修 事前調査団 報告書

－黄熱・ポリオ実験室内診断技術－

1996年12月

国際協力事業団
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序文

第三国研修とは、わが国の技術協力によって開発途上国に移転された技術を活用して、当該国の実施機関が、社会的、文化的、言語的に共通の基盤を持つ周辺の開発途上国からの研修員を受け入れ、わが国で実施することに比較して、より現地事情に適合した技術、知識の移転を図り、もって、開発途上国間協力の推進に寄与するとともに、将来的には、実施機関が独自に研修員受け入れ事業を展開することが可能となるように組織育成を行うこと等を目的として実施されるわが国研修員受け入れ事業の一形態である。第三国研修は、昭和４９年度にタイ国コラート養蚕訓練センターにおいて最初のコースが開設されて以来、要請、予算ともに増加の一途を辿り、平成８年度には全世界で１００件を越えるコースの実施が計画されるに至っている。特に近年では、途上国間の協力、いわゆる「南々協力」の最も典型的かつ効果的な方法として、一段と脚光を浴びている事業でもある。

アフリカにおける第三国研修は、わが国の過去の技術協力の成果をベースとする条件から、ニーズに比較して研修コースの新設が制限されている現状にあり、平成８年度現在でケニアで３コース、象牙海岸で１コースの合計４コースを数えるのみである。

このような中で、ガーナ大学医学部付属野口記念医学研究所を実施機関とする本件第三国研修は、平成３年度から平成７年度にかけて成功裡に実施された「ワクチン力価試験及びポリオ関連診断技術」コースの次期コースとしてガーナ政府から協力の要請がなされたものである。前回のコースは、昭和４０年代後半から継続的に実施されてきたわが国技術協力の成果を基礎に、また、世界保健機構（ＷＨＯ）が推進する「ポリオ撲滅計画」の流れに沿って、ガーナ政府とわが国政府及び国際機関であるＷＨＯの三者協力による、いわゆるマルチ・バイ技術協力の先駆けとして目覚ましい成果をあげた。

本件調査団は、厚生省の協力を得て平成８年８月２２日から９月２日までの間、ガーナにおける現地調査及び協力者となるＷＨＯ本部での協議を行った。本報告書はその結果を取り纏めたものである。

本件調査の実施にあたり、並々ならぬ協力を賜った、厚生省、国立予防衛生研究所、在ガーナ日本大使館、その他の関連機関に対して深甚なる謝意を表するものである。

平成８年１２月

国際協力事業団
研修事業部長
森本　勝

要　約

本件第三国研修は、平成３年度から平成７年度にわたり実施された「ワクチン力価試験及びポリオ関連診断技術」コースが、実施機関であるガーナ大学医学部付属野口記念医学研究所、世界保健機構（ＷＨＯ）及び日本政府の三者によるマルチ・バイ協力の成功を踏まえ、その第二フェーズとして要請されたものである。

本件第三国研修で中心的な課題となる黄熱病は、近年赤道をはさむアフリカ各国において流行の兆がみえる熱帯性感染症であり、ＷＨＯも予防接種の推進に注目し始めている重要疾患である。

本件第三国研修の実施機関となる野口研は、長年に亘るわが国技術協力により試験・研究の基盤が整備されているばかりか、ＷＨＯの指定するアフリカ地域では唯一の感染症研究所でもあり、第三国研修の実施について十分な実施能力を有することが確認された。

本件第三国研修は、黄熱病診断のための必要な施設、機材及び検査体制を有するアフリカ８か国を対象として平成８年度より３年に亘り実施することが合意された。

一般的にわが国に知見、情報の不足しているアフリカにおける人造り事業においては、ＷＨＯを始めとする国際機関との協調は、わが国技術協力の枠を広げる上で極めて有効な方法であると考えられる。その意味で本件第三国研修の帰趨は今後のマルチ・バイ技術協力の将来を占う重要な試金石になるものと思われる。

(1)　WHO本部での協議

後列：左から土井博士、有田団員、リー局長、高橋団長、ザフラン博士、チェイネ博士、
前列：左からハル博士、細川団員

(2)　野口研での協議

正面左がエンクルマ所長、右が高橋団長

目　次

1　事前調査団の派遣

1－1　調査団派遣の経緯と目的

（1）わが国は、１９６８年にガーナ大学医学部に対する保健・医療分野の技術協力を開始し、その後、１９７９年までに、「ウィルス学と電子顕微鏡」、「低栄養と感染症」、「病態生理学と免疫学」等をタイトルとした技術協力を継続的に実施してきた。これらの技術協力は、１９７７年及び７８年に無償資金協力によって設立された医学部付属野口記念医学研究所（野口研）にその活動の拠点が移され、それ以後、野口研を舞台として、文字通り、技術協力と無償資金協力が有機的に結びついた西アフリカ地域における代表的なモデルプロジェクトとして長い間内外の注目を集めてきた。

（2）このように、野口研の設立を受けて、わが国の技術協力は更なる展開を見せることとなり、１９８０年に開始された「下痢症と低栄養」、８６年度に開始された「野口記念医学研究所プロジェクト」では、ウィルス学、栄養学、及び疫学の３分野でプロジェクト方式の技術協力が行われてきた。

（3）一方、世界保健機構（ＷＨＯ）は、ＵＮＩＣＥＦ等との協力により、西暦２０００年までにポリオ（急性灰白髄炎）を地球上から撲滅させる目標のもとにポリオ撲滅運動（Polio　Eradication Initiatives）を展開してきた。これまでに、南北アメリカ大陸での成功、大洋州や中国での進展を受け、アフリカ地域を南西アジア地域と並ぶ最後の重要拠点として位置付けて積極的な取組を行ってきた。このような中で、１９８９年、ＷＨＯは、わが国の資金・技術協力により設立された野口研をアフリカ地域における最初の地域研究所（Regional Reference Laboratory）に指定するに至った。

（4）このような事情を背景として、１９９０年４月に、わが国とＷＨＯとの初めての定期協議が開催されたが（１９９２年まで３回実施されそれ以後中断）、右定期協議の場において、野口研を実施機関とするポリオ診断分野の第三国研修実施に関して両者の協力が合意された。

（5）第三国集団研修「ワクチン力価試験及びポリオ関連診断技術」コースは、最初のマルチ・バイによる第三国研修として１９９１年度から５年間にわたり、野口研を舞台に実施された。この第三国研修は、１９９５年７月に行われた終了時評価調査において、アフリカ地域におけるポリオ診断技術者の養成及び研究所間ネットワークの確立に貢献したことが確認された。

（６）右評価調査においては、ＷＨＯ、ＪＩＣＡ及び野口研の三者によるマルチ・バイ協力の有効性が立証されたことを背景に、近年、アフリカ諸国において流行の兆が顕著となっている黄熱病分野の診断技術普及の緊急性が提示されるとともに、本件分野での第三国研修における協力の可能性の検討が提案された。

（７）９５年１０月、ガーナ国政府より、わが国政府に対して、「黄熱病等ＥＰＩ関連感染症診断技術」に関する第三国研修の実施に係る要請書が提出された。

（８）本件要請を受けて、ＪＩＣＡは、本件第三国研修の実施可能性を確認し、研修範囲・内容、関係者間（ＷＨＯ及び野口研）の業務分担等について協議するとともに、実施に向けたガーナ側との協議議事録案を取り纏めることを目的として調査団を派遣することとした。

１－２　調査団の構成

タカハシ　ヨシユキ 高橋　嘉行	団長・総括	国際協力事業団研修事業部研修第三課長
アリタ　ミネオ 有田　峰生	感染症対策	厚生省国立予防衛生研究所ウィルス製剤部長
サカモト　ジュン 坂本　純	医療協力政策	厚生省大臣官房国際課国際協力専門官
ホソカワ　ヒロシ 細川　博	研修計画	国際協力事業団研修事業部研修管理課

1－3　調査日程

日順	日　時	曜	行　　程	訪　問　機　関	調　査　内　容
1	08・22	木	1150　東京発(JL-401) 1625　ロンドン着 1905　ロンドン発(BA-732) 2135　ジュネーブ 着		
2	08・23	金	1000	世界保健機構（WHO）	WHOとの業務分担について協議、基本的な合意を得る。
3	08・24	土	0700　ジュネーブ 発(LH-4575) 0825　フランクフルト 着 1220　フランクフルト 発(LH-564) 1645　アクラ 着		
4	08・25	日			（調査準備）
5	08・26	月	0900 1000 1100 1145 1400 1600	JICA事務所 日本大使館 大蔵省対外経済関係局 保健省 野口英世記念医学研究所 教育省	調査方針及び日程の打合せ 田中大使表敬訪問 局長表敬及び調査への協力依頼 保健大臣表敬訪問 所長表敬及び調査日程の打合せ 次官及び高等教育局長表敬訪問
6	08・27	火	0900 1400	野口英世記念医学研究所 ガーナ大学	第三国研修に係る協議開始 学長補佐表敬訪問
7	08・28	水	0900（高橋、細川） 0900（有田、坂本） 1700	野口英世記念医学研究所 コルレブ病院及びニャホクリニック WHOガーナ事務所	第三国研修に係る協議継続 病院視察及び意見交換 表敬訪問及び意見交換
8	08・29	木	0900 1400 1500 1600	野口英世記念医学研究所 保健省 教育省 国立公衆衛生研究所	第三国研修に係る協議継続 次官補に対する調査結果の報告 次官に対する調査結果の報告 施設見学
9	08・30	金	1030 1130 1500 2300　アクラ 発(BA-078)	野口英世記念医学研究所 大蔵省対外経済関係局 日本大使館	協議議事録（ミニッツ）の署名 局長に対する調査結果の報告 若杉公使に対する調査結果報告
10	08・31	土	0630　ロンドン着		
11	09・01	日	1945　ロンドン発(JL-402)		
12	09・02	月	1525　東京着		

1－4　主要面談者

大蔵省

William Adote	Director, International Economic Cooperation Division
Agnes Batsa	Head, Bilateral Relations
Kwasi Opoku	Japan's Desk Officer
Edmund Nkansah	Japan's Desk Officer

保健省

Brookman Amissah	Minister
J. D. Otto	Acting Director of Medical Services
Kofi Ahmed	Director, Public Health Division

教育省

Dalrymple Hayfron	Chief Director
De Heer Amissah	Executive Secretary of Tertiary Education

ガーナ大学

James Anquandah	Acting Vice Chancellor

コル・レブ教育病院

K. K. Pumpuni	Hospital Administrator

公衆衛生研究所(Public Health and Reference Laboratory)

Asamoah Adu	Head

ニャホ・クリニック

Nyaho Tamakloe	Director

世界保健機構（ＷＨＯ）

J. W. Lee	Director, Gloval Programme for Vaccines and Immunization(GPV)
Hiroyuki Doi	Medical Officer, GPV　(厚生省から出向中)
J. Cheyne	Programme Officer, GPV
Michel Zaffran	Technical Officer, Expanded Programme on Immunization
Barbara P. Hull	Technical Officer, GPV
O. Tomori	Virologist, WHO-AFRO
Martin T. Mandara	Country Resident Representative, Ghana
Fleisher Djoleto	Health Officer, Ghana
Avoke	Health Officer, Ghana

野口記念医学研究所

Francis Nkrumah	Director
A. K. Nyorka	Deputy Director
Mubarak Osei	Head, Virology Unit
P. G. Addo	Head, Animal Unit
I. A. Brandful	Research Fellow, Virology Unit
Opoku Agyarkwa	Administrative Secretary
Toshiya Kamiya	JICA Project Leader

日本大使館

田中　明久	特命全権大使
若杉　　慎	公使
本田俊一郎	専門調査員

ＪＩＣＡガーナ事務所

八林　明生	事務所長
小瀬川　修	次長
阿部記実夫	所員
Rabi Ali	Administrative Secretary

2　要請の背景

2－1　周辺国の研修ニーズ

世界保健機構（ＷＨＯ）の報告によれば、現在、アフリカ諸国のうち赤道をはさむ３３か国が黄熱病の危険地域として指定されている（次項　図１参照）。

黄熱病は、１７世紀の中頃にバルバドス諸島、キューバ、メキシコにおいて最初の発生が記録され、その後１８世紀から今世紀初めにかけて、カリブ諸島、南アメリカ、あるいはアメリカ合衆国の港町での発生が報告されている。アフリカ大陸での最初の発生は１７７８年のセネガルで記録された。１９８０年初頭から黄熱病の発生はアフリカがそのほとんどを占める状況となり、特に８５年以降は報告される発生報告の９０％以上がアフリカにおけるものとなっている。(次項　表１参照)

黄熱病は、熱帯雨林に棲息する蚊を媒介としたウィルス性の感染症であり、多くの場合、森林地帯で木材の伐採作業に携わる労務者を通じて、都市等の人口密集地域にもたらされると考えられる。典型的な症状としては、突然の高熱、悪寒、頭痛、背痛、筋肉痛、吐き気、嘔吐に加えて黄疸や出血等が見られる。

黄熱病は、ワクチンにより予防可能な感染症である。潜在的な危険地域である西アフリカ諸国においては、１９４０年代に天然痘撲滅のための大規模なワクチン接種運動の中で、黄熱病ワクチンが天然痘ワクチンと同時に接種されたことから、１９８０年代中頃までには、大規模な発生が報告されることはなかった。

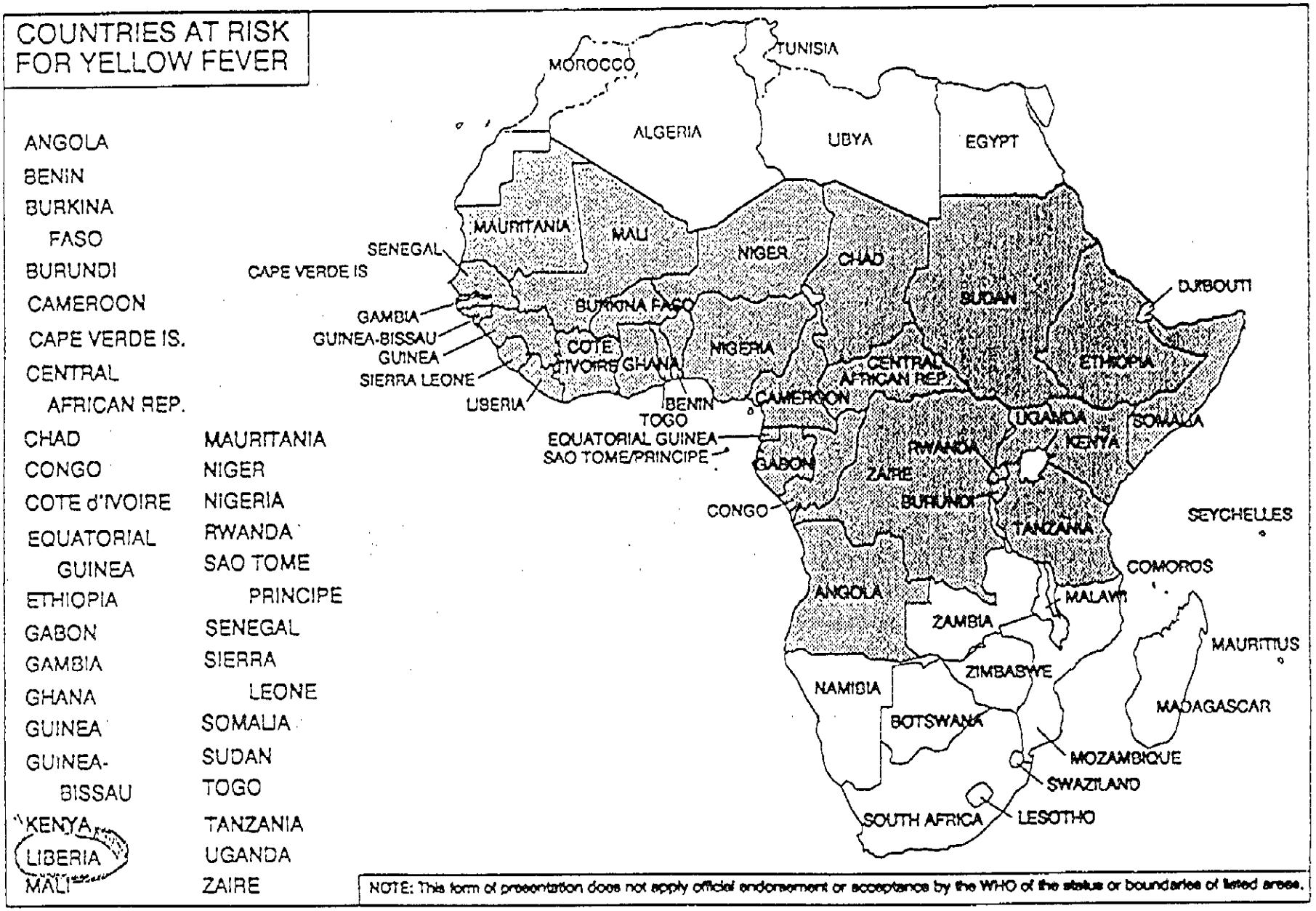

図1．アフリカの黄熱病危険地域（WHO作成資料）

表 1

YELLOW FEVER EPIDEMICS IN AFRICA

YEAR	COUNTRY	CASES/DEATHS (reported)
1958	ZAIRE	60/23
1959	SUDAN	120/88
1960～62	ETHIOPIA	100,000/30,000
1964	GUINEA	6/6
1965	SENEGAL	2,000 ～20,000/(up to 44%)
1966	ETHIOPIA	?/350
1969	GHANA	250/73
1969	MALI	21/12
1969	BURKINA FASO	3,000/100
1969	NIGERIA	100,000/40,000
1970	NIGERIA	786/40
1971	ANGOLA	65/42
1975	SIERRA LEONE	130/36
1977～79	GHANA	434/120
1978～79	GAMBIA	8,400/1,600
1981	SENEGAL	2/0
1982	COTE D'IVORE	25/25
1983	BURKINA FASO	12,500/?
1986～91	NIGERIA	30,000/7,500
1992～93	KENYA	54/28
1993	GHANA	?
1994	NIGERIA	128/80
1994	GABON	?/54
1994	KENYA	78/8
1995	LIBERIA	?

* all the data were extracted from WHO paper

しかしながら、１９９０年代に入り、多分に天然痘の絶滅による予防接種の中止により、再びアフリカ諸国において発生が顕著となってきている。最近では、９１年にナイジェリア、９２年にケニア、９３年にケニア、ガーナ、９４年にナイジェリア、ガボン、ケニア、９５年にはリベリアでの発生が報告されている（別紙　表参照）。ちなみに、１９９０年代になって発生した黄熱病の約２５％は５才以下の子供が患者となっている。このため、１９８８年には、ＷＨＯとＵＮＩＣＥＦの合同予防接種技術会議において、ＥＰＩプログラムの中に黄熱病を含めることが提案された。

一方、アフリカ諸国における黄熱病ワクチンの予防接種カバレージは極めて低いレベルにとどまっている。危険国に指定されている３３か国の中で成人の予防接種率で４５％以上を達成しているのはたった４か国に過ぎない。黄熱病ワクチンがワンショット０．１８ＵＳドル（ＷＨＯ報告による）であることが接種率向上の阻害要因のひとつとなっているものと考えられる。黄熱病ワクチンの場合接種証明書ではその有効期限が１０年となっているが、一度予防接種を受ければ、生涯にわたり一定の予防効果が持続するものと考えられている。

黄熱病の蔓延を防止するためには、ワクチンの接種と並んでサーベイランスシステムの構築が極めて重要である。これについては、アフリカ各国で既に確立されているＥＰＩ（ポリオ、麻疹等）サーベイランスシステムを準用することが可能である。黄熱病はウィルス性肝炎、マラリア等と極めて似た初期症状を呈することから、迅速かつ正確な初期診断が黄熱病の蔓延を未然に防ぐ上での重要な要件となっている。

２－２　実施国における当該分野の現状

ガーナでは黄熱病の発生が比較的頻繁に報告されている。１９５０年以降だけでも、６９年、７７年から７９年にかけて、更に、８３年、９３年にそれぞれ記録されている（ＷＨＯ報告による）。

多くの日本人が、かつて小学校の教科書で学んだとおり、野口英世博士が黄熱病研究のためにロックフェラー研究所から派遣され、志半ばの１９２８年５月に、まさに黄熱病によって倒れるまでの短い間を過ごしたアフリカの瘴癘の地がガーナである。このことからも、昔からガーナが黄熱病ウィルスの生息地として適した自然環境にあったことは疑いない。

わが国政府は、野口英世博士の偉業をたたえて、ガーナ大学医学部を通じて１９６０年代から保健医療分野での技術協力を継続的に行ってきており、特に７９年の野口記念医学研究所の設立以降は、同研究所をわが国の西アフリカ地域における医療協力の拠点施設としてプロジェクト技術協力を中心とした複合的な取組を行ってきた。

これらの状況を踏まえ、１９９１年に開始された同研究所を実施機関とするポリオ診断分野の第三国研修が、ＷＨＯの支援を得つつも成功裡に終了したことは野口研の研修実施機関としての運営能力を広く確認させることとなった。

3　調査結果の概要（第三国研修基本計画）

3－1　コース名称

英文名：Laboratory Diagnosis of Yellow Fever and Other EPI Viral Diseases (Polio and Measles)

和文名：黄熱・ポリオ実験室内診断技術

本件コースにおける主な対象疾病は黄熱病であり、研修の目的も、参加国の試験研究機関で黄熱病を担当する検査技師に対し、早期診断技術を習得させることにある。

しかしながら、アフリカ諸国における感染症の試験研究機関では、検査技師が黄熱病、ポリオ等疾病毎に専門化している訳ではなく、多くの場合、複数の感染症を兼ねて担当しているのが実態である。加えて、ポリオ及び麻疹については昨年までのコースで一定の診断技術が習得されたものと考えられるが、継続的なフォローアップの重要性が指摘されている。これらから、今次コースにおいてもポリオ及び麻疹についての診断技術をカリキュラムの一部に加えることが必要であると認められた。

この結果、コースの正式（英文）名称を黄熱病に加えて他のＥＰＩに定められるウィルス性感染症の実験室内診断技術とし、括弧の中にポリオ及び麻疹を示すこととした。

一方、和文名称については、アフリカ大陸におけるポリオ根絶に対するわが国協力の継続性を強調する目的からポリオの名前を明示することとした。

3－2　研修の目的

本件第三国研修の目的は、アフリカ諸国のうち、ＷＨＯにより黄熱病の危険地域として指定されている国の試験研究機関の検査技師に対して、それぞれの参加国において定められた感染症対策撲滅計画(National Disease Control and Eradication Programme)推進を支援する一環として、黄熱病、ポリオ及び麻疹の実験室内診断技術を習得させることである。

３－３　到達目標

各回のコース終了時において、参加研修員は以下の知識及び技術を習得していることが期待される。

（１）黄熱病、ポリオ、麻疹診断に関する基礎的知識及び実用面を重視した標準的な実験室内検査技術

（２）黄熱病、ポリオ、麻疹等の生ワクチンの有効性試験に係る知識及び技術の鍛錬

（３）黄熱病、ポリオ、麻疹に関するアフリカ地域における対策・撲滅目標の認識とこれを達成するための試験研究機関の役割の理解

３－４　協力期間

本件コースで、アフリカ地域における黄熱病サーベイランスシステムを確立し、感染の早期診断を行うための必要最小限の施設・機材を有する試験研究機関の数及びそれぞれの機関における関連検査技師の人数等を考慮し、本件研修実施の協力期間を１９９６年度から１９９８年度までの３年間とすることで合意した。

３－５　時期・期間

研修の時期については、前回コースとほぼ同様とすることで基本的に合意されたが、３月３１日までに研修経費の精算を終えるため、前回コースより約１０日間繰り上げ、第一回目のコースを１９９７年２月２４日から開始することで合意された。

また、研修期間については前回コース同様に１７日間とすることで合意された。

３－６　カリキュラム

カリキュラムは別紙＊に示すとおりであるが、基本的には午前中に講義、午後に関連する実技・実習を行うように計画されている。また、土曜日、日曜日を除く１５日のうち、ＥＰＩ全体に関しては１日、黄熱病に関しては７日、ポリオに関しては３日、麻疹に関しては２日、最終試験及びコース評価に２日の配分となっており、黄熱病を中心のテーマとしたコースであることが明確となっている。

３－７　割当国

本件コースへの参加が想定される国は、ＷＨＯにより黄熱病の危険地域に指定されているアフリカ３３か国であるが、本件コースが英語で実施されること、本件コースで提供される検査・診断技術を適用するために十分な施設・機材を有している国（具体的には研究所）であること、及び、研修機関（野口研）の受容能力等を総合的に勘案し、本件調査の段階で、以下の８か国が割当国として指定された。

カメルーン、エリトリア、エチオピア、ケニア、シエラ・レオーネ、タンザニア、トーゴ、ウガンダ、（リベリア）

ところでリベリアの取扱いについて、調査団の帰国後に外務省と改めて協議した結果、研修員応募に係る実施国（ガーナ）政府とリベリア政府との正式な外交ルート（具体的にはリベリアにおけるガーナ大使館の存在）が確認できたことから、Ｒ／Ｄの中に割当国として追加することとなった。この結果、本件コースへの割当国は最終的に９か国となる。

一方、ナイジェリアは人口規模や国内の劣悪な衛生状況を考慮すると黄熱病による被害の危険性が最も高い地域であると考えられるが、国内の民主化の遅れ等により、現在、わが国政府開発援助（ＯＤＡ）の供与が停止されていることから、同国からの研修員についてはＷＨＯが経費を負担して参加させることとなった。

３－８　定員

本件コース実施機関である野口研のウィルス部の施設・機材の状況から、受け入れ可能な研修員は１２名であることが確認された。これにより、割当国から最大で１０名、ガーナ国内から最大で２名の研修員、合計１２名を定員とすることとなった。

これら１２名の研修員は、それぞれ３つのグループに別れて実習を行うこととなる。

ＷＨＯの経費負担によるナイジェリア、ガンビア等わが国のＯＤＡ供与が停止されている国からの研修員の数は全体の４分の１を越えないこと（３名以内）が口頭ながら確認された。

３－９　応募資格

本件コースへの応募資格は以下のとおりに定められた。

（１）応募国の推薦を受けたものであること。
（２）コース参加を通じて習得した知識・技術を帰国後に活用することを応募国政府が約束するものであること。
（３）感染症診断に係る技術に関する学位、あるいは上級技術資格(Advanced Technical Diploma)を有するものであること。
（４）ＥＰＩ（ＷＨＯの推進する予防接種拡大計画）に関連したウィルス診断やワクチンの効力試験を実施している研究機関に勤務する科学者あるいは上級検査技師であること。
（５）微生物学に関する５、６年の業務経験及び最低一年のウィルス病に関する業務経験を有すること。
（６）原則として、４５歳以下であること。
（７）英語での読み書きに堪能なこと。
（８）心身共に健康であること。

4　研修機関の概要

4－1　組織及び活動

野口記念医学研究所は、１９７７年及び１９７８年に総額２０億円に及ぶわが国無償資金協力によって設立されたガーナ大学医学部付属の研究所であり、ガーナの首都アクラ市の北方約１０キロのレゴン地区に位置している。

１９９１年より二代目の研究所長としてガーナ独立の父として広く尊敬を集めている故エンクルマ大統領の息子であるフランシス・エンクルマ氏が就任し、今日に至っている。父親の威光を背景としてエンクルマ所長のカリスマ性が同研究所の長所でもあり、また、短所ともなっている。つまり、エンクルマ所長の影響力は大きく、例えば、研究所の予算の確保等にあたっては、かなりの威力を発揮しているものと想像される一方、研究所の研究活動及び研究所の運営全体に関して権限の一極集中が顕著であり、同研究所の人材及び組織育成を阻害している面も見逃せない。

エンクルマ所長は、また、アフリカ地区における感染症学会の主要メンバーであり、ＷＨＯ等の国際機関において同研究所のみならずアフリカ地域における発言力維持の源ともなっている。

ＷＨＯは、エンクルマ所長の存在、及びわが国無償資金協力による施設・機材の整備と並んで継続的に実施されてきたプロジェクト技術協力の成果を評価し、１９８９年には同研究所をアフリカ地域における感染症対策の拠点研究所（Regional Reference Laboratory）に指定された。

４－２　関連組織及び支援機関

本件第三国研修はＷＨＯの技術的な支援を得て実施されるいわゆるマルチ・バイ協力であり、コース実施のためＷＨＯから毎回２名の講師が派遣される他、ＷＨＯの開発したテキスト及び関連試薬等の提供も予定されている。

研修員の宿泊施設として、ガーナ大学のゲストハウスが提供される予定であるが、ＷＨＯ派遣の講師を含めたすべての関係者が文字通り寝食を共にすることで、単に関連技術の習得のみならず参加各国の保健・衛生の諸問題を含めた幅広い交流が期待される。

また、ＷＨＯに対しては参加各国のカントリーオフィースを通じた研修員の適切及びタイムリーなリクルート等、本コース実施に向けたサブ・ロジ両面での支援が期待される。

一方、ガーナに限らず、アフリカ諸国に共通的に見られることであるが、感染症予防・対策を効果的に実施するためには、試験研究機関と医療行政機関との、具体的には、ガーナにおける大学の研究機関あるいは科学研究省と保健省との有機的な連係の強化が不可欠であるが、本件コースの実施国であるガーナにおいても、両者の関係が円滑に行われている、あるいはそのためのシステムが機能しているとはいいがたい状況にある。この点においてもＷＨＯの積極的な働きかけや指導が期待されるところでもある。

４－３　研修実施能力

４－３－１　技術的側面

本件第三国研修の実施機関である野口研は１９９１年度から１９９５年度までの５年度に渡り、第三国研修「ワクチン力価試験及びポリオ関連技術」コースの実施を担当した。１９９５年７月に実施された右第三国研修評価調査において、ＷＨＯ及びＪＩＣＡからの技術援助を受けたものの、野口研からも講師２名の配置及び実習における助手の配置等を積極的に行ったことが評価されており、今次第三国研修の実施にあたっても同様の役割達成は十分に可能と考えられる。

また、今回の第三国研修においては、マウスやモルモット等の小動物を使った感染実験が行われるため、大量の小動物飼育技術が必要とされることが判明している。野口研には動物ユニット担当部局が既に存在しているが、平成８年度第三国研修カウンターパートの本邦研修の一環として同部の技術者の研修を実施し、第三国研修に向けた技術的な準備を行うこととした。

４－３－２　運営的側面

野口研の第三国研修に係る運営に関し、前回のコースにおいては、コースの実施時期が年度末に設定されていたため、支払い、精算業務を含む研修に係る経費の全ての取扱いをＪＩＣＡ事務所が代行して実施されていた。しかしながら、今回の調査において、野口研のこれら研修事業の運営能力を開発、向上させるため、今次コースについては、実施機関である野口研に支払い、精算業務のすべてを担わせることとした。

また、コースＧＩ等の作成については、従来通り、ＷＨＯアフリカ事務所の技術支援を受けて実施されることとなるが、前回コースにおいてエンクルマ所長不在にあってはＧＩの送付等の純手続き的な事項についても決裁なしには済まないため、所要の手続きに遅れを来すことが多かったが、この度、野口研に新たに副所長が任命されたこともあり、権限の副所長への委譲等について期待できる状況ができ上がっている。

４－４　施設・機材等

これまで繰り返し述べてきたように、野口研はわが国無償資金協力を得て設立され、アフリカの水準でいえば極めて整備された状況にあり、また、それに続くプロジェクト技術協力においても機材・備品が更に充実される等、本件研修に必要な基本的なものは既に十分に備えつけられていることが確認された。

しかし、今次第三国研修においては、実験小動物（マウス、モルモット等）が多頭必要となるため、同研究所の動物ユニットでの繁殖・飼育が不可欠となる。このためにはこれら小動物を飼育する籠（ケージ）を調達する必要があるところ、第三国研修のための消耗品としてＪＩＣＡの資金援助により購入することとした。ただし、消耗品といっても一回毎に買い替えることは必要がなく、３回のコースに共通して使用されることとなる。

一方、前回のコースでは、研修実施に必要な各種消耗品は、並行して実施されているプロジェクト技術協力専門家の携行機材によりその大部分が手当てされていたが、今次コースについては可能な限り研修経費として計上することとしプロジェクト技術協力への依存を極力排することとした。

４－５　予算

本件研修の実施に必要な経費について、今回の調査ではその全容を明らかとすることはできなかったが、ＪＩＣＡが負担するものについては概略別紙２に示すとおり。ＷＨＯはＷＨＯ派遣専門家の経費及び関連テキスト及び試薬購入に係る経費を負担することとなる。また、当然のことながら、本件研修を実施する上でガーナ側が負担することとなる間接経費は想定されることとなり、全体としては、関係者それぞれが応分の負担をすることになることはいうまでもない。

5　世界保健機構（ＷＨＯ）との協力

5－1　ＷＨＯ本部での協議

調査団は、ガーナへの途上でジュネーブに立ち寄り、世界保健機構（ＷＨＯ）本部において、ＷＨＯにおける担当部局となるワクチン予防接種計画部局を訪問し、本件第三国研修に関するＷＨＯ側の意向を確認した。

ＷＨＯは、前回の「ポリオ診断コース」においてＷＨＯ、ＪＩＣＡ、ガーナ政府（野口研）の三者協力による試みが成功したことを踏まえ、第二フェーズとなる本件コースの実施について積極的に日本側及びガーナ側に働きかけてきた経緯を踏まえ、以下に示す通り前回とほぼ同様の協力を行う意志を明確に示した。

（１）コース指導者２名の派遣（ＷＨＯの経費負担による）
（２）黄熱病ウィルス診断に係るテキストの提供
（３）関連検査用試薬の提供

更に、研修コースの準備を円滑に進めるために、研修コースＧＩの作成及びＷＨＯの各国カントリー事務所を通じた研修員リクルートに対する支援が確認された。

この、ＷＨＯ側からの協力については、本件第三国研修の実施が形の上では日本とガーナ政府の二国間の約束に基づいて実施されるものであり、従って、二国間の正式文書となるＲ／Ｄ等に明示的に含めることはできないことから、Ｒ／Ｄの署名が終了した段階で、ＪＩＣＡとＷＨＯの間で改めて書簡交換の形で取り交わすこととした。具体的な手順としては、Ｒ／Ｄへの両国政府の署名が終了した後に、ＪＩＣＡはＷＨＯに報告し、これを受けてＷＨＯは内部手続きを経た上で協力内容についてＪＩＣＡに書簡の形で連絡をすることとした。

5－2現地での協議

今回の第三国研修事前調査にＷＨＯは、本部担当者のハル博士及びＷＨＯアフリカ地域事務所のウィルス学者であるトモリ博士を参加させた。両名は調査団の野口研側との協議に終始参加し、野口研側にＷＨＯの従来通りの協力について保証を与えるとともに、研修実施に必要な機材、消耗品の確認及びコースＧＩドラフト案の作成について積極的に支援を行った。ＷＨＯの協議への参加により野口研側との協議は極めて円滑に進み本件調査の成功に寄与したものと評価される。

6　団長所感

本件第三国研修は、１９９１年から１９９５年にかけて成功裡に実施された「ワクチン力価試験及びポリオ関連診断技術」コースに引き続いて実施される、いわばマルチ・バイ協力の第二フェーズと目されるものであり、いわゆるレギュラーメンバーとなった野口研、ＷＨＯとＪＩＣＡ（及び厚生省国立予防衛生研究所）との合同によるアフリカ地域での感染症対策の切り札的なコースとなっている。

アフリカにおけるポリオを始めとする熱帯性感染症の予防、対策は、マラリアと並ぶ保健上の最大の課題であり、わが国政府も従来から単独機材供与、あるいは無償資金協力等の多彩なプログラムにより継続的な協力を行ってきた。更に、１９９６年４月に、池田外務大臣が南アフリカで開催された国連貿易と開発会議(UNCTAD)総会においてアフリカ地域の保健衛生分野の向上に引き続き積極的に取り組む姿勢を表明した。

このような中で、研修を始めとする技術協力による人造り事業は、ワクチンやコールドチェーン等の機材供与の有効性を一層高める上で、更には人と人が直接に接するいわゆる「顔の見える援助」を具現化する上で極めて重要な事業である。

しかしながら、アフリカ地域における保健、医療分野の状況に関する、わが国関係者の知見は必ずしも十分なものとはいい難いのが現状である。一方で、いわゆる国家という人為的な境界を何等の障害もなく越えて跋扈する黄熱病のような災禍に立ち向かうためには、国家の枠を越えた地域的な対応が不可欠である。

このような観点から、従来の二国間の協力の仕組みでは対応できないケースにおいては、ＷＨＯ等の国際機関の地域戦略の中でそれら機関の有する情報やノウハウを十分に活用しながら対応することが極めて重要であり、その意味ではＪＩＣＡとして、本件第三国研修のみならず、他の分野においてもこれらの国際機関との協調に一層積極的に取り組むことが求められてきていると考えられる。

本件第三国研修コースがアフリカにおけるマルチ・バイ協力の有効性を証明する成功プロジェクトとなるよう切に希望するものである。

MINUTES OF MEETINGS
BETWEEN
THE JAPANESE PRELIMINARY SURVEY TEAM
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE REPUBLIC OF GHANA
ON
THE THIRD COUNTRY TRAINING PROGRAMME

The Japanese preliminary survey team, organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Y. Takahashi, visited Ghana from the 24th to the 30th of August, 1996, in order to discuss with the authorities concerned of the Republic of Ghana a training course for participants from African countries in the field of Laboratory Diagnosis of Yellow Fever and Other EPI Viral Diseases (Polio and Measles), to be conducted in Ghana under the Third Country Training Programme of JICA.

After a series of meetings, both sides have come to a conclusion that the training course will contribute to strengthening research capabilities in the field of Laboratory Diagnosis of Yellow Fever, Polio and Measles in African countries.

Both sides drafted the Record of Discussions attached as APPENDIX I, and agreed to recommend to their respective Governments that necessary actions should be taken in order to ensure the successful implementation of the training course.

A list of attendants at the meetings is attached as APPENDIX II.

in Accra, on the 30th of August, 1996

Mr. Yoshiyuki TAKAHASHI
Head of the Japanese Survey Team,
Japan International Cooperation Agency

Prof. Francis Kwesi NKRUMAH
Director,
Noguchi Memorial Institute for Medical Research,
University of Ghana

APPENDIX I

RECORD OF DISCUSSIONS
BETWEEN
THE RESIDENT REPRESENTATIVE OF JICA GHANA OFFICE
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE REPUBLIC OF GHANA
ON
THE THIRD COUNTRY TRAINING COURSE
IN THE FIELD OF
LABORATORY DIAGNOSIS OF YELLOW FEVER AND OTHER EPI VIRAL DISEASES
(POLIO AND MEASLES)

The Japanese Preliminary Survey Team, organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Y. Takahashi, visited the Republic of Ghana between the 24th and 30th of August, 1996, had a series of discussions with the authorities concerned of the Republic of Ghana at Noguchi Memorial Institute for Medical Research, University of Ghana (hereinafter referred to as "NMIMR") with respect to the framework of a training course in the field of Laboratory Diagnosis of Yellow Fever and Other EPI Viral Diseases (Polio and Measles) under the Third Country Training Programme of JICA, and desirable measures to be taken by both Governments to ensure the successful implementation of the training course.

Based on the Minutes of Meetings concluded between the head of the Japanese Team and the director of NMIMR and subsequent dialogues, the two parties have agreed to recommend to their respective Governments the matters referred to in the documents attached hereto.

at Accra on th of Sept., 1996

Mr. Akio YATSUBAYASHI	Prof. George BENNEH
Resident Representative,	Vice Chancellor,
JICA Ghana Office	University of Ghana

ATTACHED DOCUMENT

The Government of Japan and the Government of the Republic of Ghana will cooperate with each other in organizing a training course in the field of Laboratory Diagnosis of Yellow Fever and Other EPI Viral Diseases (Polio and Measles) for participants from African countries (hereinafter referred to as "the Course") at NMIMR under the Third Country Training Programme of JICA.

The Course will be held once a year from Japanese fiscal year 1996 to 1998, subject to an annual consultation between both Governments.

The Course will be conducted in accordance with the following;

1 TITLE
The Course is entitled "Laboratory Diagnosis of Yellow Fever and Other EPI Viral Diseases (Polio and Measles)".

2 PURPOSE
The purpose of the Course is to provide participants from African countries at risk of Yellow Fever with laboratory skills to diagnose yellow fever, polio, and measles in support of National Disease Control and Eradication Programmes.

3 OBJECTIVES
At the end of the Course, participants are expected;

3-1 to have gained basic knowledge and practical aspects of standard laboratory techniques for the diagnosis of yellow fever, polio, and measles,

3-2 to have improved their knowledge and skills in the potency testing of live viral vaccines of yellow fever, polio, and measles,

3-3 to have understood the regional control and eradication goals for those diseases, and the role of laboratories in achieving them.

4 DURATION

The first Course will be held from February 24th to March 14th, 1997.

5 CURRICULUM

The tentative curriculum of the first Course is attached as ANNEX I.

6 INVITED COUNTRIES

The Governments of the following countries will be invited to apply to the Course by nominating applicant(s);

Cameroon, Eritrea, Ethiopia, Kenya, Sierra Leone, Tanzania, Togo, Uganda

Note: WHO may sponsor participants from countries other than those listed above.

7 NUMBER OF PARTICIPANTS

The number of participants shall not exceed twelve(12) in total. The number of participants from invited countries and that from Ghana shall not exceed ten(10) and two(2) respectively.

8 FACILITIES AND INSTITUTIONS

Noguchi Memorial Institute for Medical Research, University of Ghana is the venue for the Course.

9 QUALIFICATIONS FOR APPLICANTS

Applicants for the Course are;

9-1 to be nominated by their respective Governments in accordance with the procedure to be mentioned in the following chapter,
9-2 to be engaged by the nominating Governments so that the skills obtained through the Course will be appropriately utilized on their return,
9-3 to have an appropriate university qualification or advanced technical diploma,
9-4 to be scientists or senior technologists in laboratories engaged in diagnostic virology and vaccine potency testing in EPI,
9-5 to have practical experience of several years in microbiology and at least one year's bench experience in virology,
9-6 to be under forty-five(45) years of age, as a rule,
9-7 to have a good command of spoken and written English, and
9-8 to be in good health both physically and mentally, to complete the Course.

10 APPLICATION PROCEDURE

10-1 A Government applying for the Course shall forward two(2) copies of prescribed application form for each nominee to the Government of the Republic of Ghana through diplomatic channels not later than sixty(60) days before the commencement of the Course.

10-2 The Government of the Republic of Ghana will inform the applying Governments through diplomatic channels whether or not the applicant(s) is/are accepted for the Course not later than thirty(30) days before the commencement of the Course.

11 MEASURES TO BE TAKEN BY THE GOVERNMENTS OF GHANA AND JAPAN

In organizing and implementing the Course, both Governments will take the following measures in accordance with relevant laws and regulations in force in each country. The tentative schedule of implementation for the first Course is attached as ANNEX II.

11-1 The Government of the Republic of Ghana

11-1-1 The Ministry of Finance:

(1) To forward general information brochures(G.I.) to the Governments of invited countries through diplomatic channels.
(2) To receive application forms and forward them to NMIMR.
(3) To notify the results of judgment upon applications to respective applying Governments through diplomatic channels.

NOTE: To facilitate the above mentioned procedures, the Government of Ghana will be supported by WHO and/or JICA when necessary.

11-1-2 Noguchi Memorial Institute for Medical Research:

(1) To formulate the curriculum based on ANNEX I.
(2) To draft and print the G.I.
(3) To assign an adequate number of staff as instructors/research assistants to the Course.
(4) To provide training facilities and equipment for the Course.
(5) To select participants for the Course, and notify the results of the selection to the Ministry of Finance and JICA Ghana Office.
(6) To arrange accomodation in Ghana for the participants.
(7) To arrange international air tickets for the participants from the invited countries and to meet and to see them off at an airport in Ghana.

(8) To arrange domestic study tour(s) to be included in the Course.
(9) To make budgetary allocations to cover the cost in conducting the Course, excluding the expenses to be borne by JICA.
(10) To issue certificates to the participants who successfully complete the Course.
(11) To prepare and submit a course report to the JICA Ghana Office within thirty(30) days after the termination of the Course.
(12) To submit a statement of expenditure for the verification thereof to the JICA Ghana Office within thirty(30) days after the termination of the Course.
(13) To coordinate any matters related to the Course implementation.

11-2 The Government of Japan:
(1) To dispatch Japanese short-term expert(s), in accordance with the normal procedures of its technical cooperation scheme, who will support the staff of NMIMR to facilitate the implementation of the Course,
(2) To bear the following expenses through JICA (the tentative estimate of expenses for the first Course is attached as ANNEXIII),
① expenses relevant to participants from invited countries such as international economy-class flight fare, accomodation, per diem, medical insurance premium, etc.,
② expenses relevant to NMIMR such as study tours, texts, teaching aids, expendable supplies, copies and reprints, secretarial services, opening and closing ceremonies, etc.

NOTE: Technical and material support of WHO would be expected based upon discussions to be made respectively between WHO and NMIMR; and between WHO and JICA.

12 PROCEDURE FOR REMITTANCE AND EXPENDITURE

Remittance of funds for expenses to be borne by the Government of Japan and the expenditures thereof will be arranged in a following manner:

12-1 NMIMR will open a bank account in Ghana to receive the funds to be remitted by JICA, and inform the JICA Ghana Office of the names of the bank and the account holder and the account code number.
12-2 NMIMR will submit to the JICA Ghana Office a bill of estimate for the expenses to be borne by the Government of Japan not later than ninety(90) days before the commencement of the Course.
12-3 JICA will assess the bill of the estimate and remit the assessed amount of expenses to the account mentioned in 12-1 above not later than forty-five(45) days after the receipt of the bill of estimate.

12-4 NMIMR will submit to the JICA Ghana Office a statement of expenditure within thirty(30) days after the termination of the Course.

12-5 In case there is any unspent amount remitted by JICA, NMIMR will reimburse it to JICA in accordance with advice given by the JICA Ghana Office. The funds allocated for the flight fare, accomodation, per diem, and medical insurance premium shall not be appropriated for any other purposes.

12-6 When requested by JICA, NMIMR will make available for JICA's reference all the receipts and other documentary evidence to verify the expenditure stated in 12-4 above.

13 OTHERS

This attached document and the following ANNEXes attached hereto shall be deemed to be part of the Record of Discussions.

Annex I : Tentative Curriculum of the Course (for JFY 1996)
Annex II : Tentative Schedule of Implementation (for JFY 1996)
Annex III : Tentative Estimate of Expenses to be borne by the Government of Japan (for JFY 1996)

Annex I

Tentative Curriculum of the Course (for JFY 1996)

Day 1	Lecture:	The Expanded Programme on Immunization: Disease Control and Eradication Initiatives
		The Role of the Laboratory in the Control and Eradication of Diseases
	Practical:	Maintenance and Cryopreservation of Cell Cultures
Day 2	Lecture:	Global History of Yellow Fever/Overview of Yellow Fever in Africa
	Practical:	Isolation of YF Virus in Cell Culture
Day 3	Lecture:	Yellow Fever--The Disease and Differential Diagnosis Laboratory Diagnosis of Yellow Fever
	Practical:	Isolation of YF Virus in Mice
Day 4	Lecture:	Yellow Fever Surveillance/Identification of YF Virus
	Practical:	Neutralization Test in Mice for YF Virus Identification
Day 5	Lecture:	Yellow Fever Antibody Assays/Plaque Reduction Neutralization Test for YF Antibody
	Practical:	Plaque Reduction Neutralization Test
Day 6	Lecture:	Yellow Fever IgM Assay
	Practical:	Yellow Fever IgM Capture ELISA

Day 7 Lecture: Immunofluorescence

Practical: Identification of YF Virus by Immunofluorescence

Day 8 Lecture: Yellow Fever Vaccine--Composition, Stability and Use

Practice: Yellow Fever Vaccine Potency Test (Plaque or Mouse Test)

Day 9 Lecture: Regional Overview of Polio Eradication/AFP Surveillance/ Collection, Transportation of Faecal Specimens

Practical: Isolation of Polio Virus in Cell Culture

Day 10 Lecture: Preparation of Polio and Enterovirus Antiserum Pools

Prarctical: Microneutralization Test for Polio Virus Identification/ Microneutralization Test for Enterovirus Identification

Day 11 Lecture: OPV Potency Testing

Practical: OPV Potency Test in Cell Culture (CPE)

Day 12 Lecture: Measles Disease and Differential Diagnosis

Practical: Measles IgM Capture ELISA

Day 13 Lecture: Viral Haemaglutination and the HAI Test

Practical: HAI Test for Measles Antibody/HAI Test for Yellow Fever Flaviviruses

Day 14 - 15 Examination and Course Evaluation

Annex II

Tentative Schedule of Implementation (for JFY 1996)

Middle of Sept., 1996	① Signing of Record of Discussions between the Governments of Ghana and Japan
End of Oct., 1996	② Preparation of General Information (G.I.) and Submission thereof to the Ministry of Finance and JICA Ghana Office ③ Submission of Application Form (A1) for Japanese Expert(s) to the Embassy of Japan
Beginning of Nov., 1996	④ Distribution of G.I. and Application Forms to Respective Invited Governments
Beginning of Dec., 1996	⑤ Receipt of Nominations from Invited Governments
Middle of Dec., 1996	⑥ Selection of Participants and Notification thereof to Nominating Governments ⑦ Opening of Bank Account and Notification thereof to JICA Ghana Office ⑧ Submission of Bill of Estimate to JICA Ghana Office
Beginning of Jan., 1997	⑨ Receipt of Remitted Expenses from JICA Ghana Office
February-March, 1997	COURSE IMPLEMETATION
End of March, 1997	⑩ Submission of Statement of Expenditure to JICA Ghana Office
End of April, 1997	⑪ Submission of Course Report to JICA Ghana Office

Annex III

Tentative Estimation of Expenses to be borne by the Government of Japan
(For the First Course)

ITEM OF EXPENSE	BREAKDOWN	AMOUNT (US$)	REMARKS
I Invitation Expenses		28,100.00	
1 Air Fare (Round Trip)	@ 1,500 US$ × 10 Pax.	15,000.00	
2 Per-diem	@ 20 US$ × 10 Pax. × 21 days	4,200.00	
3 Accomodation	@ 40 US$ × 10 Pax. × 20 nights	8,000.00	
4 Travel Allowance	@ 100 US$ × 4 Pax.	400.00	
5 Medical Insurance Prem.	@ 50 US$ × 10 Pax.	500.00	
II Training Expenses		15,025.00	
1 Honoraria		(100.00)	
1-1 Site Visits	@ 50 US$ × 2 places	100.00	
2 Employment		(1,050.00)	
2-1 Secretary	@ 150 US$ × 1 Pax.	150.00	
2-2 Clerk	@ 75 US$ × 1 Pax.	75.00	
2-3 Technical Assistant	@ 150 US$ × 5 Pax.	750.00	
2-4 Laboratory Assistant	@ 75 US$ × 1 Pax.	75.00	
3 Transportation		(2,520.00)	
3-1 Bus Rental	@ 120 US$ × 21 days	2,520.00	
4 Material Procurement		(8,880.00)	
4-1 Plastic Mouse Cages		3,000.00	Cages will be used repeatedly. Details will be discussed later.
4-2 Consumables	@ 400 US$ × 12 Pax.	4,800.00	
4-3 Stationery	@ 50 US$ × 12 Pax.	600.00	
4-4 Teaching Materials	@ 40 US$ × 12 Pax.	480.00	
5 Meeting Expenses		(1,900.00)	
5-1 Preparatory Meeting	@ 10 US$ × 15 Pax.	150.00	
5-2 Opening Ceremony	@ 15 US$ × 50 Pax.	750.00	
5-3 Closing Ceremony	@ 20 US$ × 50 Pax.	1,000.00	
6 Others		(575.00)	
6-1 G.I. Printing	@ 7 US$ × 50 copies	350.00	
6-2 Certificate Printing	@ 5 US$ × 15 copies	75.00	
6-3 Communications	@ 3 US$ × 50 times	150.00	
TOTAL		43,125.00	

APPENDIX II

A List of Attendants at the Meetings

Ghanaian Side

Prof. F. K. Nkrumah	Director, NMIMR
Dr. A. K. Nyarko	Deputy Director, NMIMR
Dr. M. Osei-Kwasi	Head of Virology Unit, NMIMR
Mr. J. Brandful	Research Fellow of Virology Unit, NMIMR
Dr. P. Addo	Head of Animal Unit, NMIMR
Mr. S. Opoku-Agyakwa	Administrative Secretary, NMIMR
Mr. Kwasi Opoku	Japan's Desk Officer, Ministry of Finance

Japanese Side

Mr. Y. Takahashi	Director, 3rd Training Division, JICA
Dr. M. Arita	Director, Dept. of Viral Diseases and Vaccine Control, National Institute of Health
Mr. J. Sakamoto	Advisor on International Cooperation, Ministry of Health and Welfare
Mr. H. Hosokawa	Senior Administrator, Training Dept., JICA
Mr. K. Abe	Assistant Resident Representative, JICA Ghana Office
Ms. Rabi Ali	Assistant Administrative Officer, JICA Ghana Office

Observers

Dr. B. Hull	Virologist, Global Programme for Vaccines and Immunization, WHO
Dr. O. Tomori	Virologist, WHO-AFRO

RECORD OF DISCUSSIONS
BETWEEN
THE RESIDENT REPRESENTATIVE OF JICA GHANA OFFICE
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE REPUBLIC OF GHANA
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Based on the Minutes of Meetings concluded between the head of the Japanese Team and the director of NMIMR and subsequent dialogues, the two parties have agreed to recommend to their respective Governments the matters referred to in the documents attached hereto.

at Accra on 27th of Sept., 1996

Mr. Akio YATSUBAYASHI
Resident Representative,
JICA Ghana Office

Prof. George BENNEH
Vice Chancellor,
University of Ghana

ATTACHED DOCUMENT

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At the end of the Course, participants are expected;

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	Practical:	Neutralization Test in Mice for YF Virus Identification
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	Practical:	Plaque Reduction Neutralization Test
Day 6	Lecture:	Yellow Fever IgM Assay
	Practical:	Yellow Fever IgM Capture ELISA

Day 7	Lecture:	Immunofluorescence
	Practical:	Identification of YF Virus by Immunofluorescence
Day 8	Lecture:	Yellow Fever Vaccine--Composition, Stability and Use
	Practice:	Yellow Fever Vaccine Potency Test (Plaque or Mouse Test)
Day 9	Lecture:	Regional Overview of Polio Eradication/AFP Surveillance/ Collection, Transportation of Faecal Specimens
	Practical:	Isolation of Polio Virus in Cell Culture
Day 10	Lecture:	Preparation of Polio and Enterovirus Antiserum Pools
	Prarctical:	Microneutralization Test for Polio Virus Identification/ Microneutralization Test for Enterovirus Identification
Day 11	Lecture:	OPV Potency Testing
	Practical:	OPV Potency Test in Cell Culture (CPE)
Day 12	Lecture:	Measles Disease and Differential Diagnosis
	Practical:	Measles IgM Capture ELISA
Day 13	Lecture:	Viral Haemaglutination and the HAI Test
	Practical:	HAI Test for Measles Antibody/HAI Test for Yellow Fever Flaviviruses

Day 14 - 15 Examination and Course Evaluation

Annex II

Tentative Schedule of Implementation (for JFY 1996)

Middle of Sept., 1996	① Signing of Record of Discussions between the Governments of Ghana and Japan
End of Oct., 1996	② Preparation of General Information (G .I.) and Submission thereof to the Ministry of Finance and JICA Ghana Office ③ Submission of Application Form (A1) for Japanese Expert (s) to the Embassy of Japan
Beginning of Nov., 1996	④ Distribution of G.I. and Application Forms to Respective Invited Governments
Beginning of Dec., 1996	⑤ Receipt of Nominations from Invited Governments
Middle of Dec., 1996	⑥ Selection of Participants and Notification thereof to Nominating Governments ⑦ Opening of Bank Account and Notification thereof to JICA Ghana Office ⑧ Submission of Bill of Estimate to JICA Ghana Office
Beginning of Jan., 1997	⑨ Receipt of Remitted Expenses from JICA Ghana Office
February-March, 1997	COURSE IMPLEMETATION
End of March, 1997	⑩ Submission of Statement of Expenditure to JICA Ghana Office
End of April, 1997	⑪ Submission of Course Report to JICA Ghana Office

Annex III

Tentative Estimation of Expenses to be borne by the Government of Japan
(For the First Course)

ITEM OF EXPENSE	BREAKDOWN	AMOUNT (US$)	REMARKS
I Invitation Expenses		28,100.00	
1 Air Fare (Round Trip)	@ 1,500 US$ × 10 Pax.	15,000.00	
2 Per-diem	@ 20 US$ × 10 Pax. × 21 days	4,200.00	
3 Accomodation	@ 40 US$ × 10 Pax. × 20 nights	8,000.00	
4 Travel Allowance	@ 100 US$ × 4 Pax.	400.00	
5 Medical Insurance Prem.	@ 50 US$ × 10 Pax.	500.00	
II Training Expenses		15,025.00	
1 Honoraria		(100.00)	
1-1 Site Visits	@ 50 US$ × 2 places	100.00	
2 Employment		(1,050.00)	
2-1 Secretary	@ 150 US$ × 1 Pax.	150.00	
2-2 Clerk	@ 75 US$ × 1 Pax.	75.00	
2-3 Technical Assistant	@ 150 US$ × 5 Pax.	750.00	
2-4 Laboratory Assistant	@ 75 US$ × 1 Pax.	75.00	
3 Transportation		(2,520.00)	
3-1 Bus Rental	@ 120 US$ × 21 days	2,520.00	
4 Material Procurement		(8,880.00)	
4-1 Plastic Mouse Cages		3,000.00	Cages will be used repeatedly.
4-2 Consumables	@ 400 US$ × 12 Pax.	4,800.00	Details will be discussed later.
4-3 Stationery	@ 50 US$ × 12 Pax.	600.00	
4-4 Teaching Materials	@ 40 US$ × 12 Pax.	480.00	
5 Meeting Expenses		(1,900.00)	
5-1 Preparatory Meeting	@ 10 US$ × 15 Pax.	150.00	
5-2 Opening Ceremony	@ 15 US$ × 50 Pax.	750.00	
5-3 Closing Ceremony	@ 20 US$ × 50 Pax.	1,000.00	
6 Others		(575.00)	
6-1 G.I. Printing	@ 7 US$ × 50 copies	350.00	
6-2 Certificate Printing	@ 5 US$ × 15 copies	75.00	
6-3 Communications	@ 3 US$ × 50 times	150.00	
TOTAL		43,125.00	

FACSIMILE MESSAGE

October 16th, 1996

From: Yoshiyuki TAKAHASHI
Director, 3rd Training Div.,
Japan Int. Cooperation Agency
Tel. 81-03-5352-5145/6/7/8
Fax. 81-03-5352-5018/9

To: Dr. Barbara HULL
Global Programme for Vaccine
and Immunization,
World Health Organization
Tel. 41-22-791-4405
Fax. 41-22-791-0746

Re: Yellow Fever/Polio Training Course in Ghana

Dear Dr.Hull,

I am pleased to inform you that the Record of Discussions on the captioned training course was duly signed between both governments of Ghana and Japan as attached herewith. After coming back to Japan, we concluded to include Liberia as one of the invited countries to the course on JICA's expenses.

Now, as we discussed and agreed upon in Geneva and Accra, I would like you to take necessary measures for the provision of technical inputs of WHO, which is undoubtedly a crucial step to a successful course implementation.

It is highly appreciated if you accordingly provide us with a letter confirming WHO contribution to the course for our further ease.

With best regards

WORLD HEALTH ORGANIZATION ORGANISATION MONDIALE DE LA SANTE

Direct Téléphone: 41 (22) 791 4798/4804
Facsimile direct: 41 (22) 791 4889/4192
GPV Internet address: GPV@who.ch
Internet Address leejw@who.ch
In reply please refer to:

Mr Yoshiyuki Takahashi
Director, Third Training Division
Japan International Cooperation Agency
Shinjuku-Mitsui Bld,
2-1-1 Nishi-Shinjuku
Shinjuku-ku, Tokyo 162-04
Japan

12 December 1996

Dear Mr Takahashi,

Thank you for the Record of Discussions between the governments of Ghana and Japan on the training courses on "Laboratory Diagnosis of Yellow Fever and other EPI Viral Diseases (Polio and Measles)," which are to be held in Ghana in 1997 to 1999.

It was proposed during your visit to visit to Geneva in August, 1996, and during discussions at the Noguchi Institute in Accra, that the World Health Organization should provide the following:

1. Two facilitators for each course
2. Training manuals and technical protocols
3. Reference reagents (cell cultures, antigens and antisera).

I hereby confirm this contribution and look forward to a successful collaboration.

Yours sincerely,

Dr J. W. Lee
Director
Global Programme for Vaccines and Immunization

CH-1211 GENEVA 27-SWITZERLAND Telegr.:UNISANTE-GENEVE Telephone: 41 (22) 791 2111 Fax: 41 (22) 791 0746 CH-1211 GENEVE 27-SUISSE

GENERAL INFORMATION

A. INFORMATION

A.1 Rationale

In 1989, the Noguchi Memorial Institute for Medical Research (NMIMR), Legon, Ghana, was nominated by the WHO as a collaborating laboratory in support of EPI. In that capacity and for the purpose of polio eradication in the African Region, the Institute, from 1991 to 1996, provided training for staff from other laboratories in the Region in polio diagonsis and vaccine potency testing. At the conclusion of the programme, it was agreed by participating sponsors, WHO and JICA, that a new training course in "Laboratory Diagnosis of Yellow Fever and Other EPI Viral Diseases (Polio and Measles)" be conducted at the NMIMR for participants from African countries.

A.2 Title

The title of the Course is "Laboratory Diagnosis of Yellow Fever (YF), and Other EPI Viral Diseases (Polio and Measles)".

A.3 Aims

The purpose of the Course is primarily, to provide participants from African countries with the opportunity of upgrading relevant techniques and knowledge in laboratory diagnosis of Yellow Fever (YF), and other EPI viral diseases (Polio and Measles); and to make such capability accessible to every African country.

A.4. Objectives

At the end of the Course, participants are expected to:

(1) Have the basic knowledge and application of standard techniques and procedures in laboratories supporting the Expanded Programme on Immunization (EPI).

(2) Improve their knowledge and techniques in the laboratory diagnosis of YF, Polio and Measles, as well as potency testing for YF, Polio and Measles vaccines.

(3) Support National and Regional Disease Control and Eradication Programmes.

A.5 Duration

February 24 to March 14, 1997.

A.6 Training Institute

Noguchi Memorial Institute for Medical Research (NMIMR), University of Ghana, Legon, Ghana.

A.7. Curriculum

The Course Curriculum is attached as Annex 1.

A.8. Methodology

The Course will be conducted in the form of lectures and practical sessions in diagnostic techniques and vaccine potency testing procedures for YF, Polio and Measles.

A.9 Language

The Course will be conducted in English.

A.10 Certificate

Certificates will be awarded to participants who successfully complete the Course.

B. APPLICATION INFORMATION

B.1 Qualification of Applicants

Applicants for the Course are:

(1) to be nominated by their respective Governments in accordance with the procedure to be mentioned in the following chapter,

(2) to be engaged by the nominating Governments so that the skills obtained through the Course will be appropriately utilized on their return,

(3) to have an appropriate University qualification or advanced technical diploma,

(4) to be scientisits or senior technologists in laboratories engaged in diagnostic virology and vaccine potency testing in EPI,

(5) to have practical experience of several years in microbiology and at least one year's bench experience in virology,

(6) to be under forty-five years (45) years of age, as a rule,

(7) to have a good command of spoken and written English, and

(8) to be in good health both physically and mentally, to complete the Course.

B.2 Procedure for Application

(1) A government desiring to nominate applicant(s for the course should fill in and forward ***one copy*** of nomination forms for each applicant to the International Economic Relations Division, Ministry of Finance, P.O. Box M.40, Accra and ***one copy*** to the Director, Noguchi Memorial Institue for Medical Research, University of Ghana, P.O. Box 25, Legon, Ghana, ***not later than 1st December each year***. It will be helpful that the WHO-country office is informed of the nimination(s).

(2) The Government of Ghana in conjunction with NMIMR will inform the applying Government whether or not the nominee's application has been accepted not later than mid-December each year.

B.3 Country Report

Participants are requested to prepare a report of their respective countries on:

(1) the present situation in their field of study and interest,

(2) the status of (disease) surveillance for YF, Polio and Measles (including number of cases and vaccination coverage for previous year).

(3) the role of participant's laboratory in the diagnosis of YF, Polio and Measles.

(4) the relationship between the laboratory and the National EPI Programme.

It is important for participants to contact the national EPI authority in preparing the Country Report.

Country Reports should be typewritten in accordance with the attached form (Annex II) and submitted to NMIMR on arrival in Ghana.

Country Reports will be used during the Course for training and assessment of participants.

C. ALLOWANCES AND EXPENSES:

The following expenses in accordance with JICA and NMIMR rules and regulations will be covered for each participant:

(1) Return air-ticket (normal economy fare) between the international airport designated by Accra.

(2) Free accommodation in addition to an allowance of 20 US$ per day as pocket money.

(3) Medical insurance premium.

(4) Expenses for study tours.

D. REGULATIONS

Participants are required:

(1) To observe strictly the course schedule and not to change training subject.

(2) Not to extend the training period.

(3) Not to bring any member of their family.

(4) To return to their home country on completion of the course according to the travel schedule designated by NMIMR.

(5) To carry out such instructions and abide by such conditions as may be stipulated by both the nominating government and the Ghana Government in respect of the training.

(6) To observe the rules and regulations of the training institution or establishment in which participants undertake study or training.

(7) To refrain from engaging in political activities, or any form of employment for profit or gain.

(8) To discontinue the course, should they fall seriously ill and be considerd unable to continue the training or commit an improper act.

OTHERS

(1) **Preliminary Instruction:**

Participants are requested to report in person to the local JICA Office or in the absence of JICA Office, WHO country office in their own country in order to complete the necessary procedures and obtain pre-departure instructions.

(2) **Visa:**

Before leaving their country, participants should obtain a visa for entry to Ghana which will be issued by the diplomatic missions of Ghana in their countries. Where there is no Ghana Embassy, the Noguchi Institute (NMIMR) could be informed early enough to arrange for a visa on arrival in Ghana.

(3) **Air-ticket:**

Participants are requested to arrive in and leave Ghana on the date designated by NMIMR. The date will be finally confirmed by the air-ticket sent to the participants. Participants who receive the air-ticket but are unable to travel are obliged to return the ticket or refund its value to NMIMR.

(4) **Photograph:**

For administration purposes, participants are requested to bring five (5) copies of a recent photograph (passport size).

(5) **Airport:**

On arrival at the Kotoka International Airport, Accra, participants are requested to note the following arrival procedues:

(1) When immigration and customs clearance procedures have been completed, participants should proceed to the exit and look for NMIMR staff who will page participant's name and country.

(2) NMIMR staff will guide participants to their hotels.

(6) **Correspondence:**

For inquiries and further information please contact local JICA office or WHO country office. In case of difficulty, address correspondence to:

The Director,
N.M.I.M.R.,
University of Ghana,
P.O. Box 25,
Legon,
Ghana.

Tel. No. 233-21-500374, 501180, 501178, 501179

Fax No. 233-21-502182
InternetNo. Noguchi @ncs.com.gh.

ANNEX 1

TENTATIVE CURICULUM OF THE COURSE (FOR JFY 1996)

Day 1 -	Lecture	:	The Expanded Programme on Immunization: Disease Control and Eradication Initiatives.
			The Role of the Laboratory in the Control and Eradication of Diseases.
	Practical	:	Maintenance and Cryopreservation of Cell Cultures.
Day 2 -	Lecture	:	Global History of Yellow Fever/Overview of Yellow Fever in Africa.
	Practical	:	Isolation of YF Virus in Cell Culture.
Day 3 -	Lecture	:	Yellow Fever -- The Disease and Differential Diagnosis -- Laboratory Diagnosis of Yellow Fever.
	Practical	:	Isolation of YF Virus in Mice
Day 4 -	Lecture	:	Yellow Fever Surveillance/Identification of YF Virus.
	Practical	:	Neutralization Test in Mice for YF Virus Identification.
Day 5 -	Lecture	:	Yellow Fever Antibody Assays/Plaque Reduction Neutralization Test for YF Antibody.
	Practical	:	Plaque Reduction Neutralization Test.
Day 6 -	Lecture	:	Yellow Fever IgM Assay
	Practical	:	Yellow Fever IgM Capture ELISA.

Day 7	-	Lecture	:	Immunofluorescence
		Practical	:	Identification of YF Virus by Immuno-fluorescence.
Day 8	-	Lecture	:	Yellow Fever Vaccine -- Composition, Stability and Use.
		Practical	:	Yellow Fever Vaccine Potency Test (Plaque or Mouse Test).
Day 9	-	Lecture	:	Regional Overview of the Polio Eradication/AFP Surveillance/Collection, Transportation of Faecal Specimens.
		Practical	:	Isolation of Polio Virus in Cell Culture.
Day 10	-	Lecture	:	Preparation of Polio and Enterovirus Anti-serum Pools.
		Practical	:	Microneutralization Test for Polio Virus - Identification/Microneutralization Test for Enterovirus Identification.
Day 11	-	Lecture	:	OPV Potency Testing.
		Practical	:	OPV Potency Test in Cell Culture (CPE).
Day 12	-	Lecture	:	Measles Disease and Differential Diagnosis.
		Practical	:	Measles IgM Capture ELISA.
Day 13	-	Lecture	:	Viral Haemagglutination and the HAI Test.
		Practical	:	HAI Test for Measles Antibody-HAI Test for Yellow Fever Flaviviruses.
Day 14	-	Examination and Course Evaluation.		

ANNEX II

COUNTRY REPORT
ON
LABORATORY DIAGNOSIS OF YELLOW FEVER
AND
OTHER EPI RIVAL DISEASES
(POLIO AND MEASLES)

1. **Name of Country:**.....
2. **Name of Participant:** .....
3. **Name of Organization:** .....
4. **Organization Chart**

   A. Present situation of Vaccine Potency Testing and Polio Diagnostic Procedures;
   B. Services of the Organization.
   C. Your present position indicated in the Organization chart.
   D. Job in detail in the organization.

5. Reported Number of Cases And Vaccine Coverage, 1995.
   Name of Country .....

DISEASE	NUMBER OF CASES	VACCINATION COVERAGE*
YELLOW FEVER		
POLIO		
MEASLES		

* SPECIFY AGE GROUP VACCINATED.

6. **Role Of Your Laboratory In Surveillance And Diagnosis of Diseases, Especially Yellow Fever, Polio and Measles.**

for a course in "Laboratory Diagnosis of Yellow Fever (YF), and Other EPI Viral Diseases (Polio and Measles)" from the 24th February - 14th March 1997 at the Noguchi Memorial Institute for Medical Research (NMIMR), University of Ghana in co-operation with JICA and WHO.

and certifies that

a. All information supplied by the nominee are complete and correct.

b. Nominee is a university graduate, or has the equivalent academic background.

c. Nominee is presently working for a laboratory at the national level which functions in support of EPI either in vaccine production, quality control, potency testing or polio diagnostics.

d. Nominee has practical experience of several years in the related field.

e. Nominee is under forty-five (45) years of age.

f. Nominee has a good command of spoken and written English, and

g. Nominee is in good health, both physically and mentally, to complete the course.

Name of Certifying Government

Official Address

Place & Date

Discussion document

A framework for CONTROL OF YELLOW FEVER IN AFRICA

April,1996

Global Programme for Vaccines and Immunization
in association with the Division of Emerging and other Communicable Diseases
World Health Organization

SUMMARY

During the past four years there has been a dramatic resurgence of yellow fever in Africa. The number of cases is probably greater now than before systematic immunization started in the 1930s. Though yellow fever is generally a rural disease associated with forest areas the threat to urban areas in Africa is increasing. During 1995, for example, cases of yellow fever have been confirmed in Monrovia and other urban areas of Liberia, causing a significant epidemic threat.

During the past 10 years, all 33 countries at risk of yellow fever have built extensive immunization services and are now able to support the introduction of routine infant yellow fever immunization and planned mass campaigns. Furthermore, the Global Advisory Group of the Expanded Programme on Immunization recommended that yellow fever vaccine be added to routine immunization programmes. (see attached EPI update - March 1992)

With external financial support yellow fever can be controlled in Africa within five years using four complementary strategies:

- Surveillance
- Outbreak prevention
- Outbreak response
- Routine immunization

External support needed in millions of US dollars (excluding outbreak response) over a five year period:

Campaign	145 195 669
Routine	48 124 974
Surveillance	231 650

These sums are based on the need for coverage of all 33 countries. Individual countries or groups of countries can be selected for support. These funds are needed for vaccine procurement, national support and technical assistance. Thus funds can be transferred to a procurement agency for example UNICEF, directly to the country or countries selected, or to WHO.

Approximately 35% of the funds are needed in the countries and can be provided directly.

Over 50% of the funds are assigned for vaccine procurement. (Two of the world's major yellow fever vaccine manufacturers are located in the European Union).

Approximately 15% of the funds are needed for technical assistance.

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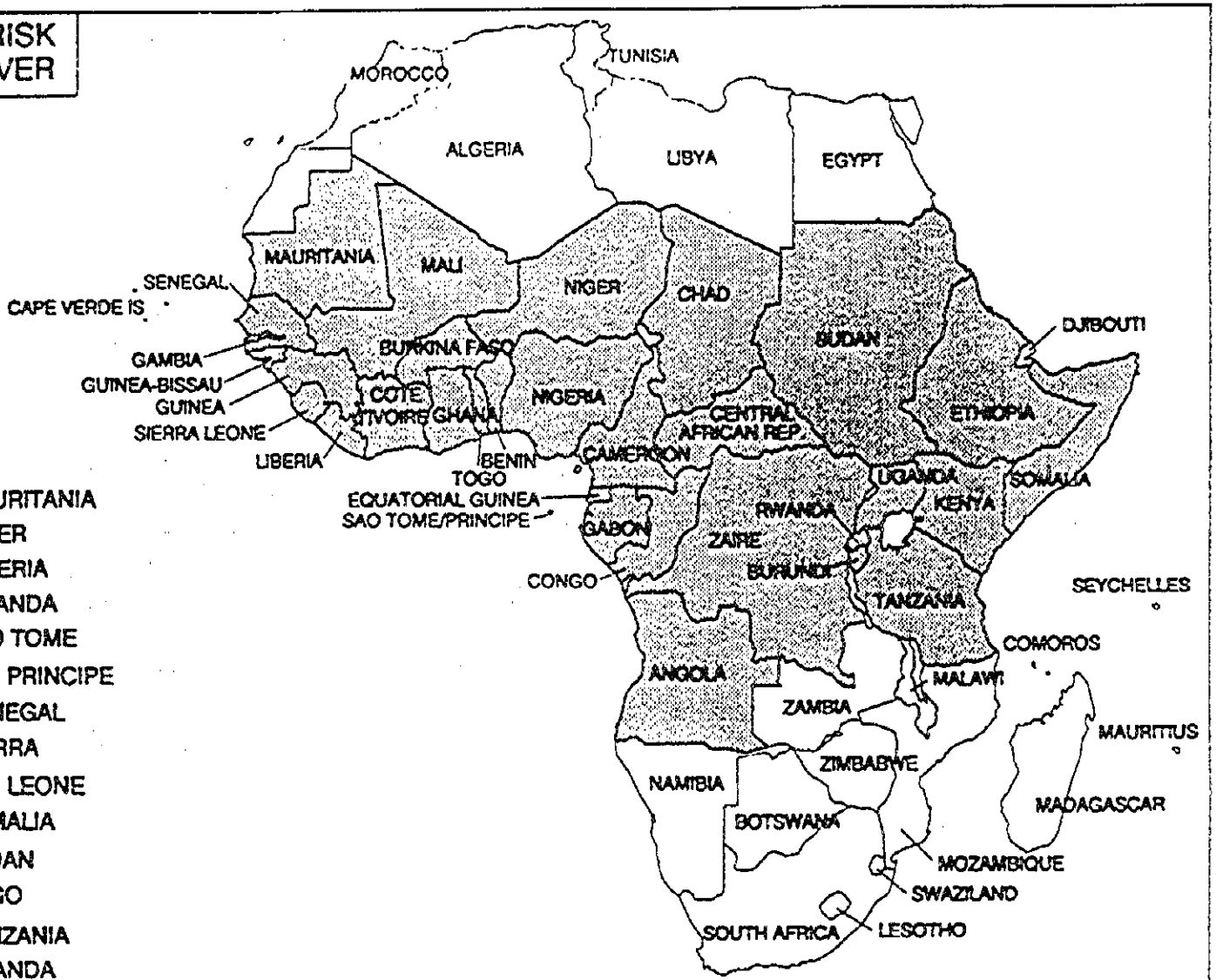
COUNTRIES AT RISK FOR YELLOW FEVER

ANGOLA
BENIN
BURKINA FASO
BURUNDI
CAMEROON
CAPE VERDE IS.
CENTRAL AFRICAN REP.
CHAD
CONGO
COTE d'IVOIRE
EQUATORIAL GUINEA
ETHIOPIA
GABON
GAMBIA
GHANA
GUINEA
GUINEA-BISSAU
KENYA
LIBERIA
MALI
MAURITANIA
NIGER
NIGERIA
RWANDA
SAO TOME PRINCIPE
SENEGAL
SIERRA LEONE
SOMALIA
SUDAN
TOGO
TANZANIA
UGANDA
ZAIRE



NOTE: This form of presentation does not apply official endorsement or acceptance by the WHO of the status or boundaries of listed areas.

In the absence of routine immunization and planned campaigns, the cost of outbreak control could exceed US$5 million each year for the coming five years and beyond.

BACKGROUND

THE DISEASE

Yellow fever is an acute infectious disease characterized by sudden onset of fever, chills, head, back and muscle pain, nausea and vomiting. These may progress to jaundice and haemorrhagic signs. Death usually occurs 7-10 days after onset of illness, following a period of remission on the third or fourth day. During epidemics, the case fatality rate for unimmunized adults may exceed 50%, and for children 70%.

The agent which causes yellow fever is a mosquito-borne virus which is involved in two transmission cycles. In "jungle" yellow fever, transmission occurs between forest-dwelling mosquitoes and non-human primates, while in the "urban" cycle transmission is between domestic mosquito species, especially *Aedes aegypti*, and man. Humans may acquire the infection through the bite of an infected jungle mosquito and may return to an urban area where they become ill 3 to 6 days later. An *Aedes* mosquito feeding on such a person may initiate an outbreak of urban yellow fever.

STATUS

A total of 21,661 cases of yellow fever were reported from Africa during 1986 to 1995. However,epidemiological studies have shown that this is a greatly under-reported disease, and have estimated the true incidence to be ten times this figure.The spread of yellow fever from settlements on the fringe of the jungle is related to the growth of large urban communities which favor the proliferation of *Aedes* mosquitoes. The combination of poor immunization levels and rapid urbanization present ideal conditions for the development of explosive epidemics. The most recent of these occurred in Liberia in 1995, where the 360 reported cases probably are a small fraction of the true number and where patients with yellow fever were hospitalized in Monrovia and Buchanan, urban areas where few people have been exposed to the virus previously.

Extensive use of yellow fever vaccine in French west Africa from 1939 to 1952 resulted in a sharp decline in incidence in these countries.This was given by scarification together with smallpox vaccine, and was discontinued with the eradication of smallpox. Manufacture of the French Neurotropic vaccine used was discontinued in 1980. A resurgence of yellow fever followed, resulting in epidemics during the 1990's with over 25% of cases occurring in children less than 5 years old.

The presently used vaccine, based on the 17D strain, meets strict WHO requirements of safety and is one of the most effective vaccines, resulting in the development of long lasting antibody in 95% or more of recipients. It is recommended for use in children over 6 months of age.

Immunization coverage in Africa remains low and yellow fever has re-emerged, after more than 10 years of absence, in Kenya(1992), Ghana(1993), Gabon(1994) and Liberia(1995). It will continue to produce expensive and disruptive epidemics and menace urban areas unless there is a concerted effort to anticipate and prevent them through a long term programme of surveillance and immunization.

Yellow fever vaccine is currently manufactured at the Institut Pasteur, Senegal. Its production capacity is in excess of 15 million doses each year.

COUNTRIES AT RISK IN AFRICA

Yellow fever is endemic in 33 countries of equatorial Africa shown on the attached map. Their combined population is 468 million. Immunization services and disease reporting systems are well established, and all countries are committed to the goals of measles reduction and polio eradication by the year 2000. Many will be conducting national immunization days with oral polio vaccine during 1996 and 1997. Improvement in disease surveillance is expected to follow, and to be

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sustainable. Linking yellow fever to the planned polio and measles activities could prevent major yellow fever epidemics and save thousands of lives each year after 1997.

STRATEGIES

Four strategies, implemented concurrently, have the potential to bring yellow fever fully under control in Africa.

A **Surveillance**
B **Outbreak prevention**
C **Outbreak response**
D **Routine immunization**

These four strategies and the associated activities are described in detail below.

A *SURVEILLANCE*

A continuing, sensitive system of surveillance is essential in all at-risk countries for the early detection of cases which will permit rapid action to contain an outbreak. Even in countries which have instituted preventive measures, vigilance is needed to detect spread of the virus from its jungle reservoirs to the human population. The task of identifying an early,isolated case before it triggers an epidemic is made more difficult by the need to distinguish yellow fever from diseases with similar symptoms such as hepatitis, malaria and other febrile jaundice. Laboratories capable of differential diagnosis are essential.

Following the identification of a focus of virus activity in the Kerio Valley in Kenya in 1992-1993, a system of active surveillance was set up by EPI and CDS, the predecessor of EMC based on selected health facilities around the area. This has detected continuing activity through 1995. These findings highlight the feasibility of comprehensive surveillance and follow-up action in all 33 African countries at risk.

The Expanded Programme on Immunization has an extensive surveillance system that covers all EPI vaccine preventable diseases, and in collaboration with the Division of Emerging and other Communicable diseases (EMC) this system includes yellow fever. The system is highly effective for some diseases but less so for yellow fever. Investment in surveillance will help to ensure that the funds put into immunization are well monitored and managed.

ACTIVITIES

1. Develop guidelines on case detection and investigation, data collection and management, specimen collection and transport
2. Conduct awareness and planning seminars for medical and laboratory personnel
3. Train field staff and laboratory personnel in selected reference laboratories
4. Procure supplies for specimen collection and transport
5. Procure laboratory reagents
6. Identify resources for follow-up action

B *OUTBREAK PREVENTION*

An individual of any age who has not been immunized or had a natural infection is susceptible to yellow fever. The success of immunization in west Africa in the 40's and 50's highlights the effectiveness of achieving high coverage of the population. Although a yellow fever vaccination certificate is valid for only 10 years under the International Health Regulations, antibodies persist for

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a much longer time, probably for life. Mass campaigns are needed in the countries at risk on a one-time basis for urban populations and villages at risk close to forests. The figures in this proposal are based on 50% of the population being at risk, and would have to be adjusted based on individual country estimates.

ACTIVITIES

1. Identify funding for vaccines, syringes and operations
2. Decide on timing and coordination with other campaigns
3. Plan publicity, logistics and cold chain
4. Identify and train staff
5. Immunize
6. Review progress and problems

C *OUTBREAK RESPONSE*

Measures to control epidemics of yellow fever have been hampered by the late recognition and reporting of the disease. In Africa, delays of two months or more are not uncommon between epidemics and their recognition. This is due in part to the occurrence of the earliest cases in remote areas with few medical services and the unfamiliarity of medical personnel with the disease. Another factor is the occurrence of other diseases such as viral hepatitis, malaria and leptospirosis which may be clinically confused with yellow fever, and the lack of laboratory capability in many countries for confirming the diagnosis.

Appropriate responses to the report of a possible outbreak include collection and testing of specimens, epidemic investigation to determine the scope of the outbreak, emergency vaccination of at-risk populations, entomological investigation and vector control, and institution of measures to prevent spread of virus from patients to mosquitoes.

ACTIVITIES

1. Initiate epidemiological investigation
2. Collect blood samples from febrile cases and send to nearest competent virological laboratory
3. Arrange for emergency supplies of vaccine
4. Vaccinate at-risk groups
5. Conduct entomological investigation
6. Begin vector control operations in affected urban areas
7. Instruct health facilities in transmission control
8. Extend mass vaccination

D *ROUTINE IMMUNIZATION*

The incorporation of yellow fever vaccine into the routine EPI was recommended in 1988 by a joint WHO/UNICEF Technical Group on Immunization in Africa. It was suggested that this be done at the visit for measles immunization at 9 to 12 months of age, thus avoiding the need for an additional visit. To date 16 of the 33 at-risk countries report coverage by the first birthday. Coverage levels in 1994 ranged from less than 1% in Mali to 87% in the Gambia. Only four countries achieved over 45% yellow fever vaccine coverage in infants. Many of the countries which have not begun infant immunization or which show low coverage are among the poorest, and the cost of yellow fever vaccine (0.18 USD per dose) is a major obstacle to achieving high coverage.

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In the Gambia, yellow fever was added to the EPI in 1979 following a successful mass campaign in which 97% of the population over 6 months of age received a dose. There have been no subsequent reports of yellow fever from that country. Analysis of the cost of this intervention showed that the addition of yellow fever did not significantly increase the per dose cost of vaccines delivered in the EPI.

ACTIVITIES

1. Estimate annual population of children surviving to 9 months
2. Identify funds for vaccine, syringes and additional service costs
3. Train staff at immunization centers
4. Add yellow fever to immunization cards
5. Educate mothers/guardians
6. Routine review of progress and constraints

FUNDING

The table that follows is a five-year summary, by country and by activity, of the expected funding requirements in US dollars.

These figures are entirely consistent with a plan for yellow fever control prepared by the African Regional Office of WHO as part of their plan of action for al EPI diseases in Africa for the 1990s. An extract is attached as one annex.

The supplementary resources needed are also listed at the end of the table. These resources are in support of the following activities and supplies:

Strategy A - Surveillance

- YF surveillance guides, English and French
- Forms
- Information seminars for District medical staff
- Training for field staff collecting data and specimens
- Training in laboratory diagnosis
- Reagents and supplies
- Vaccine for response

Strategy B - Outbreak prevention

- Vaccine
- Syringes
- Cold chain equipment
- Operational costs
- Public mobilization

Strategy C - Outbreak response

- Vaccine (Stockpiles for emergency use).
- Syringes
- Extra cold chain equipment
- Operational costs
- Personnel (consultants)
- Insecticide and spraying equipment
- Clean-up campaign/mosquito nets

Strategy D - Routine immunization

- Vaccine, routine through UNICEF
- Additional service costs
- Training of EPI field staff
- Vaccination cards
- Public education (lower key than B)

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Costs of Campaigns - Yellow Fever

Countries			Vaccine			Transport			Training					
Financially Dependant	Total Population	Target population 70%	Vaccine cost	Syringe Cost	Cold Box Cost	Airfreight Vaccines	Airfreight Syringes	Local Transport	Materials	Publicity	Workshop	Project Manager	Misc.	Total
Benin	5 574 000	3 901 800	1 033 977	386 707	41 359	109 602	45 495	10 000	5 650	10 000	2 000	29 042	5 000	1 678 832
Burkina Faso	10 593 000	7 415 100	1 965 002	734 911	78 600	208 290	86 460	10 000	9 040	10 000	2 000	29 042	5 000	3 138 344
Burundi	6 578 000	4 604 600	1 220 219	456 362	48 809	129 343	53 690	10 000	5 650	10 000	2 000	29 042	5 000	1 970 115
CAR	3 397 000	2 377 900	630 144	235 674	25 206	66 795	27 726	5 000	4 520	5 000	2 000	29 042	5 000	1 036 106
Chad	6 543 000	4 580 100	1 213 727	453 934	48 549	128 655	53 404	10 000	5 650	10 000	2 000	29 042	5 000	1 959 960
Equatorial Guinea	410 000	287 000	76 055	28 445	3 042	8 062	3 346	5 000	2 260	5 000	2 000	29 042	5 000	167 252
Ethiopia	56 713 000	39 699 100	10 520 262	3 934 578	420 810	1 115 148	462 892	10 000	37 290	10 000	2 000	29 042	5 000	16 547 021
Gambia	1 155 000	808 500	214 253	80 130	8 570	22 711	9 427	5 000	2 260	5 000	2 000	29 042	5 000	383 393
Ghana	17 972 000	12 580 400	3 333 806	1 246 843	133 352	353 383	146 687	10 000	13 560	10 000	2 000	29 042	5 000	5 283 675
Guinea	6 903 000	4 832 100	1 280 507	478 909	51 220	135 734	56 342	10 000	5 650	10 000	2 000	29 042	5 000	2 064 404
Guinea-Bissau	1 096 000	767 200	203 308	76 037	8 132	21 551	8 946	5 000	2 260	5 000	2 000	29 042	5 000	366 276
Kenya	29 137 000	20 395 900	5 404 914	2 021 438	216 197	572 921	237 816	10 000	20 340	10 000	2 000	29 042	5 000	8 529 667
Liberia	3 140 000	2 198 000	582 470	217 844	23 299	61 742	25 629	5 000	3 390	5 000	2 000	29 042	5 000	960 415
Mali	11 134 000	7 793 800	2 065 357	772 444	82 614	218 928	90 876	10 000	9 040	10 000	2 000	29 042	5 000	3 295 300
Mauritania	2 333 000	1 633 100	432 772	161 857	17 311	45 874	19 042	5 000	3 390	5 000	2 000	29 042	5 000	726 287
Niger	9 465 000	6 625 500	1 755 758	656 653	70 230	186 110	77 253	10 000	7 910	10 000	2 000	29 042	5 000	2 809 957
Rwanda	8 160 000	5 712 000	1 513 680	566 116	60 547	160 450	66 602	10 000	6 780	10 000	2 000	29 042	5 000	2 430 218
Sao Tomé & Principe	135 000	94 500	25 043	9 366	1 002	2 655	1 102	5 000	2 260	5 000	2 000	29 042	5 000	87 468
Sierra Leone	4 617 000	3 231 900	856 454	320 314	34 258	90 784	37 684	5 000	4 520	5 000	2 000	29 042	5 000	1 390 055
Somalia	9 484 000	6 638 800	1 759 282	657 971	70 371	186 484	77 408	10 000	7 910	10 000	2 000	29 042	5 000	2 815 469
Sudan	28 855 000	20 198 500	5 352 603	2 001 873	214 104	567 376	235 515	10 000	20 340	10 000	2 000	29 042	5 000	8 447 852
Tanzania	30 536 000	21 375 200	5 664 428	2 118 496	226 577	600 429	249 235	10 000	21 470	10 000	2 000	29 042	5 000	8 936 677
Togo	4 269 000	2 988 300	791 900	296 170	31 676	83 941	34 844	5 000	4 520	5 000	2 000	29 042	5 000	1 289 093
Uganda	21 963 000	15 374 100	4 074 137	1 523 727	162 965	431 858	179 262	10 000	15 820	10 000	2 000	29 042	5 000	6 443 811
Zaire	45 281 000	31 696 700	8 399 626	3 141 460	335 985	890 360	369 584	10 000	30 510	10 000	2 000	29 042	5 000	13 223 566
Partially independent countries														
Angola	11 469 000	8 028 300	2 127 500	795 685	85 100	225 515	93 610	10 000	9 040	10 000	2 000	29 042	5 000	3 392 491
Cameroon	13 609 000	9 526 300	2 524 470	944 152	100 979	267 594	111 077	10 000	10 170	10 000	2 000	29 042	5 000	4 014 482
Cape Verde	403 000	282 100	74 757	27 959	2 990	7 924	3 289	5 000	2 260	5 000	2 000	29 042	5 000	165 221
Congo	2 665 000	1 865 500	494 358	184 890	19 774	52 402	21 752	5 000	3 390	5 000	2 000	29 042	5 000	822 607
Côte d'Ivoire	14 733 000	10 313 100	2 732 972	1 022 131	109 319	289 695	120 251	10 000	11 300	10 000	2 000	29 042	5 000	4 341 709
Nigeria	115 020 000	80 514 000	21 336 210	7 979 743	853 448	2 261 638	938 793	10 000	74 580	10 000	2 000	29 042	5 000	33 500 454
Senegal	8 532 000	5 972 400	1 582 686	591 925	63 307	167 765	65 696	10 000	6 780	10 000	2 000	29 042	5 000	2 534 201
Financially independent country														
Gabon	1 358 000	950 600	251 909	94 214	10 076	26 702	11 084	5 000	2 260	5 000	2 000	29 042	5 000	442 288
TOTAL			91 494 536	34 218 956	3 659 781	9 698 421	4 021 818	270 000	371 770	270 000	66 000	958 386	165 000	145 194 669

Cost of Routine Immunization - Yellow Fever (A) Vaccines

Countries Financially Dependant	1996			1997			1998			1999			2000			Total Cost
	Surviving Infants 000's	Vaccine cost US$	Vaccine freight US$	Surviving Infants 000's	Vaccine Cost US$	Vaccine Freight US$	Surviving Infants 000's	Vaccine Cost US$	Vaccine Freight US$	Surviving Infants 000's	Vaccine Cost US$	Vaccine Freight US$	Surviving Infants 000's	Vaccine Cost US$	Vaccine Freight US$	
% Coverage	60%			65%			70%			75%			80%			
Benin	236	37 524	3 978	240	41 340	4 382	244	45 262	4 798	248	49 290	5 225	253	53 636	5 685	251 120
Burkina Faso	412	65 508	6 944	417	71 828	7 614	424	78 652	8 337	431	85 661	9 080	438	92 856	9 843	436 323
Burundi	255	40 545	4 298	258	44 441	4 711	260	48 230	5 112	263	52 271	5 541	267	56 604	6 000	267 752
CAR	121	19 239	2 039	123	21 187	2 246	124	23 002	2 438	126	25 043	2 655	128	27 136	2 876	127 861
Chad	242	38 478	4 079	246	42 374	4 492	251	46 561	4 935	255	50 681	5 372	260	55 120	5 843	257 934
Equatorial Guinea	15	2 385	253	15	2 584	274	15	2 783	295	16	3 180	337	16	3 392	360	15 842
Ethiopia	2 305	366 495	38 848	2 343	403 582	42 780	2 383	442 047	46 857	2 428	482 565	51 152	2 477	525 124	55 663	2 456 112
Gambia	41	6 519	691	42	7 235	767	43	7 977	846	44	8 745	927	44	9 328	989	44 022
Ghana	654	103 986	11 023	667	114 891	12 173	681	126 326	13 391	694	137 933	14 621	709	150 308	15 933	700 588
Guinea	288	45 792	4 854	294	50 642	5 368	299	55 465	5 879	305	60 619	6 426	311	65 932	6 989	307 964
Guinea-Bissau	39	6 201	657	39	6 718	712	40	7 420	787	40	7 950	843	41	8 692	921	40 901
Kenya	1 148	182 532	19 348	1 176	202 566	21 472	1 204	223 342	23 674	1 231	244 661	25 934	1 257	266 484	28 247	1 238 261
Liberia	124	19 716	2 090	126	21 704	2 301	129	23 930	2 537	132	26 235	2 781	135	28 620	3 034	132 946
Mali	451	71 709	7 601	458	78 891	8 362	466	86 443	9 163	475	94 406	10 007	484	102 608	10 876	480 067
Mauritania	81	12 879	1 365	82	14 125	1 497	84	15 582	1 652	85	16 894	1 791	87	18 444	1 955	86 183
Niger	416	66 144	7 011	429	73 895	7 833	440	81 620	8 652	451	89 636	9 501	460	97 520	10 337	452 150
Rwanda	309	49 131	5 208	315	54 259	5 751	321	59 546	6 312	327	64 991	6 889	333	70 596	7 483	330 166
Sao Tomé & Principe	6	954	101	6	1 034	110	6	1 113	118	6	1 193	126	6	1 272	135	6 155
Sierra Leone	182	28 938	3 067	184	31 694	3 360	186	34 503	3 657	189	37 564	3 982	191	40 492	4 292	191 549
Somalia	407	64 713	6 860	411	70 795	7 504	416	77 168	8 180	423	84 071	8 912	432	91 584	9 708	429 494
Sudan	1 018	161 862	17 157	1 039	178 968	18 971	1 061	196 816	20 862	1 084	215 445	22 837	1 107	234 684	24 877	1 092 478
Tanzania	1 148	182 532	19 348	1 171	201 705	21 381	1 193	221 302	23 458	1 215	241 481	25 597	1 237	262 244	27 798	1 226 845
Togo	165	26 235	2 781	168	28 938	3 067	171	31 721	3 362	174	34 583	3 666	178	37 736	4 000	176 088
Uganda	950	151 050	16 011	964	166 049	17 601	979	181 605	19 250	995	197 756	20 962	1 012	214 544	22 742	1 007 570
Zaire	1 854	294 786	31 247	1 888	325 208	34 472	1 924	356 902	37 832	1 965	390 544	41 398	2 011	426 332	45 191	1 983 912
Partially independent countries																
Angola	490	77 910	8 258	502	86 470	9 166	514	95 347	10 107	526	104 543	11 082	537	113 844	12 067	528 793
Cameroon	501	79 659	8 444	513	88 364	9 367	525	97 388	10 323	537	106 729	11 313	549	116 388	12 337	540 311
Cape Verde	13	2 067	219	13	2 239	237	14	2 597	275	14	2 783	295	14	2 968	315	13 995
Congo	104	16 536	1 753	106	18 259	1 935	107	19 849	2 104	109	21 664	2 296	111	23 532	2 494	110 422
Côte d'Ivoire	635	100 965	10 702	649	111 790	11 850	665	123 358	13 076	682	135 548	14 368	701	148 612	15 753	686 021
Nigeria	4 522	718 998	76 214	4 584	789 594	83 697	4 651	862 761	91 453	4 724	938 895	99 523	4 806	1 018 872	108 000	4 788 006
Senegal	328	52 152	5 528	334	57 532	6 098	340	63 079	6 685	346	68 768	7 289	353	74 836	7 933	349 891
Financially independent country																
Gabon	46	7 314	775	48	8 268	876	50	9 275	983	51	10 136	1 074	52	11 024	1 169	50 895
TOTAL		3 101 454	328 754		3 419 163	362 431		3 748 955	397 389		4 092 461	433 801		4 451 364	471 845	20 807 617

Cost of Routine Immunization - Yellow Fever (B) Operations

Countries Financially Dependant	1996 Surviving Infants 000's	1996 Cost of shipped syringe	1996 Service Delivery US$	1997 Surviving Infants 000's	1997 Cost of shipped syringe	1997 Service Delivery US$	1998 Surviving Infants 000's	1998 Cost of shipped syringe	1998 Service Delivery US$	1999 Surviving Infants 000's	1999 Cost of shipped syringe	1999 Service Delivery US$	2000 Surviving Infants 000's	2000 Cost of shipped syringe	2000 Service Delivery US$	Total Cost
% Coverage	60%			65%			70%			75%			80%			
Benin	236	180	54 462	240	198	60 000	244	202	65 692	248	237	71 538	253	241	77 846	330 597
Burkina Faso	412	314	95 077	417	345	104 250	424	351	114 154	431	411	124 327	438	418	134 769	574 416
Burundi	255	195	58 846	258	213	64 500	260	215	70 000	263	251	75 865	267	255	82 154	352 494
CAR	121	92	27 923	123	102	30 750	124	103	33 385	126	120	36 346	128	122	39 385	168 327
Chad	242	185	55 846	246	203	61 500	251	208	67 577	255	243	73 558	260	248	80 000	339 568
Equatorial Guinea	15	11	3 462	15	12	3 750	15	12	4 038	16	15	4 615	16	15	4 923	20 855
Ethiopia	2 305	1 759	531 923	2 343	1 937	585 750	2 383	1 970	641 577	2 428	2 316	700 385	2 477	2 363	762 154	3 232 134
Gambia	41	31	9 462	42	35	10 500	43	36	11 577	44	42	12 692	44	42	13 538	57 955
Ghana	654	499	150 923	667	551	166 750	681	563	183 346	694	662	200 192	709	676	218 154	922 318
Guinea	288	220	66 462	294	243	73 500	299	247	80 500	305	291	87 981	311	297	95 692	405 432
Guinea-Bissau	39	30	9 000	39	32	9 750	40	33	10 769	40	38	11 538	41	39	12 615	53 845
Kenya	1 148	876	264 923	1 176	972	294 000	1 204	995	324 154	1 231	1 174	355 096	1 257	1 199	386 769	1 630 160
Liberia	124	95	28 615	126	104	31 500	129	107	34 731	132	126	38 077	135	129	41 538	175 022
Mali	451	344	104 077	458	379	114 500	466	385	125 462	475	453	137 019	484	462	148 923	632 004
Mauritania	81	62	18 692	82	68	20 500	84	69	22 615	85	81	24 519	87	83	26 769	113 459
Niger	416	317	96 000	429	355	107 250	440	364	118 462	451	430	130 096	460	439	141 538	595 251
Rwanda	309	236	71 308	315	260	78 750	321	265	86 423	327	312	94 327	333	318	102 462	434 661
Sao Tomé & Principe	6	5	1 385	6	5	1 500	6	5	1 615	6	6	1 731	6	6	1 846	8 103
Sierra Leone	182	139	42 000	184	152	46 000	186	154	50 077	189	180	54 519	191	182	58 769	252 173
Somalia	407	311	93 923	411	340	102 750	416	344	112 000	423	404	122 019	432	412	132 923	565 425
Sudan	1 018	777	234 923	1 039	859	259 750	1 061	877	285 654	1 084	1 034	312 692	1 107	1 056	340 615	1 438 238
Tanzania	1 148	876	264 923	1 171	968	292 750	1 193	986	321 192	1 215	1 159	350 481	1 237	1 180	380 615	1 615 131
Togo	165	126	38 077	168	139	42 000	171	141	46 038	174	166	50 192	178	170	54 769	231 819
Uganda	950	725	219 231	964	797	241 000	979	809	263 577	995	949	287 019	1 012	965	311 385	1 326 458
Zaire	1 854	1 415	427 846	1 888	1 561	472 000	1 924	1 591	518 000	1 965	1 875	566 827	2 011	1 918	618 769	2 611 802
Partially independent countries																
Angola	490	374	113 077	502	415	125 500	514	425	138 385	526	502	151 731	537	512	165 231	696 151
Cameroon	501	382	115 615	513	424	128 250	525	434	141 346	537	512	154 904	549	524	168 923	711 315
Cape Verde	13	10	3 000	13	11	3 250	14	12	3 769	14	13	4 038	14	13	4 308	18 424
Congo	104	79	24 000	106	88	26 500	107	88	28 808	109	104	31 442	111	106	34 154	145 369
Côte d'Ivoire	635	485	146 538	649	537	162 250	665	550	179 038	682	651	196 731	701	669	215 692	903 140
Nigeria	4 522	3 451	1 043 538	4 584	3 790	1 146 000	4 651	3 845	1 252 192	4 724	4 507	1 362 692	4 806	4 585	1 478 769	6 303 371
Senegal	328	250		334	276	83 500	340	281	91 538	346	330	99 808	353	337	108 615	384 936
Financially independent country																
Gabon	46	35	10 615	48	40	12 000	50	41	13 462	51	49	14 712	52	50	16 000	67 003
TOTAL		14 887	4 425 692		16 412	4 962 500		16 710	5 441 154		19 644	5 939 712		20 031	6 460 615	27 317 357

Yellow Fever Surveillance Development Costs
(for 5 years in 33 countries)

		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
1	Guidelines and forms	33 900 56 500				
2	Awareness seminars	37 290	37 290	37 290		
3A	Field staff training	24 860	24 860	24 860 24 860	24 860 24 860	24 860 24 860
3B	Laboratory staff training	50 850	50 850	50 850	50 850	50 850
3C	Consultant support to laboratories	22 600	22 600	22 600		
4	Specimen collection	24 860	24 860 24 860	24 860 24 860 24 860	24 860 24 860 24 860	24 860 24 860 24 860
5	Reagents	56 500	56 500	56 500	56 500	56 500
	Totals by year	**307 360**	**241 820**	**291 540**	**231 650**	**231 650**

ANNEX ONE

Extract from the Plan for Vaccine preventable diseases in the African Region. WHO, regional Office for Africa, Brazzaville

YELLOW FEVER CONTROL

From 1987 to 1991, a total of 18 735 cases of yellow fever were reported from Member States in the African Region. This represent the greatest amount of yellow fever activity reported to WHO for any 5-year period since reporting began in 1948. Almost all the increase in yellow fever activity is reported from the African Region. Fewer cases were reported in 1992 (295 cases) and in 1993 (393 cases). In 1994, there was another resurgence of yellow fever in Africa with outbreaks reported in West Africa (Ghana, Nigeria), Central Africa (Gabon) and East Africa (Kenya).

Since 1965, outbreaks have been reported in Angola (1988), Burkina Faso (1969, 1983, 1984, 1985), Cameroon (1990), Gambia (1978, 1979), Ghana (1977-79, 1983, 1993-1994), Côte d'Ivoire (1979, 1982), Mali (1987), Nigeria (1974, 1979, 1986-1991), Senegal (1965), Sierra Leone (1975), and Togo (1987). In 1993, an outbreak of yellow fever was reported for the first time since 1943 in Kenya with 54 patients meeting the case definition and 28 deaths (VFR 52%). Difficulties encountered in obtaining laboratory confirmation of the outbreak in Kenya underscored the need for improved surveillance and laboratory diagnostic capabilities for yellow fever in the African Region. In 1994, the first outbreak ever documented in Gabon occurred from November 1994 to January 1995 in the North East Region of the country. Some 30 cases were reported.

Outbreak investigations have shown that a high percentage of cases are now occurring among children. For example, during the yellow fever outbreak in Ghana during 1993-1994, 27% (28/103) reported cases were under 5 years of age, and 18% (19/103) were 5 to 14 years of age. In 1991, the Ministry of Health in Nigeria reported 25% (568/2229) of all yellow fever cases under 5 years of age and 29% (641/2229) between 5 and 14 years of age.

WHO has identified 33 countries in the African Region currently at risk for yellow fever epidemics. In 1998, the joint WHO/UNICEF Technical Group on Immunization in Africa recommended that yellow fever immunization be integrated into immunization programmes in all 33 countries. However, financing yellow fever vaccine is a major obstacle to its procurement. Although 17 countries adopted the policy, only 13 (Angola, Burkina Faso, Central African Republic, Chad, Côte d'Ivoire, Gabon, Gambia, Ghana, Mali, Mauritania, Niger, Senegal and Togo) were able to obtain funds to finance and procure the vaccine. Annex two shows the costs of integrating yellow fever vaccine into routine immunization services. To date, reports of yellow fever epidemics in countries without routine immunization against yellow fever have managed to mobilize the enormous resources required to conduct emergency immunization campaigns. However, these outbreak control measures disrupt health services and strain donor resources as well as health workers.

Since 1994 training course on polio diagnostic techniques and vaccine potency testing held at the Nogochi Memorial Institute for Medical Research for eight countries (The Gambia, Ghana, Kenya, Nigeria, Tanzania, Uganda, Zaire, Zimbabwe) also included training on yellow fever vaccine potency testing, and the IgM assay for yellow fever diagnosis. A workshop on yellow fever laboratory diagnosis was also conducted in June 1995 at Kemri, in Kenya. Following the training, it is important to ensure the supply of laboratories with necessary equipment and supplies. Training/refresher courses are also needed for pathologists in the African Region to improve diagnostic capabilities based on histopathology. Improved surveillance for yellow fever in countries at risk is also necessary for early identification of outbreaks.

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SURVEILLANCE OF TARGET DISEASES

In September 1992, a surveillance system was introduced in the Region for the reporting of the EPI target diseases. The system aims to encourage high quality surveillance and data utilization at the country level. EPI/AFRO currently produces a quarterly EPI bulletin with feedback information to encourage Member States to improve completeness and timeliness of reporting, analyze their data and use the data for action. Approximately 38 (87%) of the countries in the Region can provide monthly surveillance data on vaccine-preventable diseases to the Regional Office.

Completeness and timeliness of reporting must improve in all Member States if data are to be useful for disease control. The assessments of disease surveillance and control conducted during 1992 to 1994 in Botswana, Kenya, Lesotho, Malawi, Swaziland, Tanzania, Rwanda and Zimbabwe indicated a need to introduce standard case definitions, and to train and mobilize provincial and district level staff to investigate all cases of NNT and acute flaccid paralysis, and outbreaks of measles. The introduction of standard performance indicators is also necessary to monitor the quality of surveillance and stimulate its improvement at national, provincial and district levels.

MEASLES CONTROL

The regional objectives for measles control require:

- *90% reduction in measles incidence in every country compared to pre-immunization levels by 1995, and*
- *95% reduction in measles mortality in every country compared to pre-immunization levels.*

POLIOMYELITIS ERADICATION

The regional objectives for polio eradication require that, by the year 2000:

- *there will be no cases of clinical poliomyelitis associated with wild poliovirus,*
- *there will be no wild poliovirus identified anywhere in the Region, through virological sampling of AFP cases, contacts and possibly waste water,*
- *the process of independent certification of polio free status will be initiated at the national level, leading to full regional certification.*

HEPATITIS B CONTROL

The regional objective for Hepatitis B control requires:

- *introduction of Hepatitis B vaccine into the childhood immunization programme of all Member States by 1997,*
- *attainment of at least 70% regional coverage by one year of age with three doses of HB vaccine by the Year 2000.*

YELLOW FEVER CONTROL

The regional objective for yellow fever control requires:

- *introduction of yellow fever vaccine into the childhood immunization programme in all 33 countries at risk by 1997,*
- *attainment of at least 80% coverage with yellow fever vaccine in children under 5 years of age in all 33 countries at risk by the Year 2000.*

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IMPROVING DISEASE CONTROL

Immunization Activities

The Regional Office will promote and support the implementation of effective immunization strategies, both routine and supplemental, to achieve the eradication of poliomyelitis, elimination of neonatal tetanus, and control of measles and yellow fever.

National immunization programmes will implement the necessary strategies to achieve and sustain in each district at least 80% coverage by one year of age for all scheduled childhood vaccines.

National health authorities will plan and conduct the necessary supplemental immunization activities and targeted approaches to achieve the EPI disease reduction/eradication targets.

Disease surveillance and response

The Regional Office will strengthen the regional EPI surveillance system to encourage timely and complete reporting of EPI priority diseases and monitoring of standard performance indicators. The Regional Office will regularly provide feedback information through visits as other forms of communication including the EPI bulletin.

National health authorities will need to increase the efficiency of the disease surveillance systems, particularly at the district level by improving the completeness and timeliness of reporting of AFP, NNT and measles among the priority communicable diseases. National health authorities will need to implement obligatory immediate reporting and response for all cases of AFP.

National health authorities will provide appropriate training and mobilization of national, provincial and district level staff to investigate every case of suspected AFP and neonatal tetanus as well as every outbreak of measles. They will also ensure prompt and appropriate outbreak response immunization.

National health authorities will strive to collect two fecal specimens from every reported AFP case and ensure the transport of specimens via a reverse cold chain to a WHO-designated national polio-laboratory.

National health authorities will establish a system for regular feedback of EPI-reloted surveillance data to reporting units.

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ANNEX TWO

Extract from the Plan for Vaccine preventable diseases in the African Region. WHO, regional Office for Africa, Brazzaville

Cost of introducing yellow fever vaccine into routine childhood immunization services

Assumptions

1. *The following countries at risk will incorporate yellow fever into their schedule:*

In 1996: *Island Nations at risk: Cape Verde, Sao Tome & Principe*
Central Block Countries at risk: Cameroon, Congo, Equatorial Guinea
Western Block Countries at risk: Benin, Guinea, Guinea Bissau, Liberia, Sierra Leone

In 1997: *Eastern Block Countries at risk: Burundi, Eritrea, Kenya, Rwanda, Tanzania, Uganda*

In 1998: *Countries in difficult circumstances at risk: Ethiopia, Nigeria, Zaire*

Note: the following countries at risk have already procured yellow fever vaccine and incorporated into their schedule: Angola, Burkina Faso, CAR, Côte d'Ivoire, Gabon, Gambia, Ghana, Mali, Mauritania, Niger, Senegal, Togo.

2. *Measles coverage is based on data reported to WHO as of August 1994.*

3. *The number of yellow fever vaccine doses is calculated using the estimated size of the 1993 surviving infant population, a population growth rate of 3.2%, the established "start date", the 1993 measles immunization coverage level as an approximate baseline for yellow fever immunization coverage, and increasing annual coverage.*

4. *The vaccine wastage rate is 40% which is equivalent to a wastage factor of 1.66.*

5. *The cost of freight is calculated as 10% of vaccine costs.*

6. *The analysis covers all 33 countries at risk in the WHO African Region.*

7. *Costs have been divided in four categories:*

- *Vaccine*
- *Syringe/needles*
- *freight*
- *incremental service delivery costs*

8. *Incremental service delivery costs are the small amount of additional resources required to add yellow fever vaccine to the existing childhood immunization programme. The costs include additional supervision, social mobilization and labor. They are roughly estimated to be $0.38 in addition to the $15 per fully immunized child (see table 1).*

9. *1 dose of yellow fever vaccine (10 dose vial)* = *$0.25*
1 syringe/needle and fraction of the sterilizer = *$0.05*

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Based on the Plan for Vaccine preventable diseases in the African Region
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INTRODUCTION OF YELLOW FEVER VACCINE INTO THE CHILDHOOD IMMUNIZATION PROGRAMMES OF 33 COUNTRIES AT RISK

Countries	Target Pop. 1993 ** (millions)	Measles coverage ***	Start Date	Percent coverage yellow fever vaccine 1995 reported	1996 projected	1997 projected	1998 projected	1999 projected	2000 projected
Angola *	0.4501	47	1994	30	60	65	70	75	80
Benin	0.2215	66	1996		70	74	78	80	83
Burkina Faso*	0.3951	41	1994	45	55	63	70	75	80
Burundi	0.2422	67	1997			67	72	77	80
Cameroon	0.4672	33	1996		45	50	60	70	80
Cape Verde	0.0133	95	1996		95	95	95	95	95
CAR*	0.1274	56	1994	36	60	65	70	75	80
Chad*	0.2267	25	1994	28	35	45	60	70	80
Congo	0.0979	47	1996		54	60	67	75	80
Côte d'Ivoire*	0.5905	52	1994	38	64	68	72	76	80
Equat. Guinea	0.0143	70	1996			72	76	78	80
Ethiopia	2.3067	22	1998				65	75	80
Gabon*	0.0476	65	1994	23	70	75	80	82	85
Gambia*	0.035	66	1994	87	90	90	90	90	95
Ghana*	0.6163	50	1994	22	60	67	72	75	80
Guinea	0.2708	56	1996		56	60	66	72	80
Guinea Bissau	0.0372	52	1996		55	63	70	75	80
Kenya	1.0373	40	1997			55	65	75	80
Liberia	0.1149	40	1996		45	60	65	72	80
Mali*	0.4236	51	1994	3	63	67	72	77	80
Mauritania *	0.088	49	1994	55	55	63	70	74	80
Niger*	0.3751	18	1994	17	40	50	60	70	80
Nigeria	4.738	34	1998	1	60	65	72	77	80
Rwanda	0.3523	81	1997	25	35	45	55	69	90
Sao Tome	0.005	69	1996	2	75	80	85	89	90
Senegal*	0.3076	46	1994	46	60	65	70	75	80
Sierra Leone	0.1823	67	1996		70	73	75	77	80
Somalia	0.407	30					50	70	80
Sudan	1.018	74					50	70	80
Togo*	0.1548	47	1994	14	55	65	70	75	80
Tanzania	1.213	77	1997			85	80	83	85
Uganda	0.8605	68	1997			73	75	77	80
Zaire	1.7346	17	1998	8			65	73	80
Coverage with yellow fever vaccine				50%	59%	67%	72%	78%	83%
Total # At risk countries receiving YF vaccine				17	24	29	33	33	33

** Target populations is Surviving Infants = Pop. x CBR x (1 - IMR)
*** 1993 measles coverage based on data reported to WHO as of 8/94

Extract from the Plan for Vaccine preventable diseases in the African Region
WHO, Regional Office for Africa, Brazzaville

INTRODUCTION OF YELLOW FEVER VACCINE INTO THE CHILDHOOD IMMUNIZATION PROGRAMMES OF 33 COUNTRIES AT RISK

COUNTRIES	# Surviving Infants Immunized with YF Vaccine (000) 1995	1996	1997	1998	1999	2000	Total
Angola	232	288	322	357	395	435	2 029
Benin	0	165	180	196	207	222	970
Burkina Faso	184	232	274	315	348	383	1 736
Burundi	0	0	178	198	218	234	828
Cameroon	0	224	257	318	383	452	1 634
Cape Verde	0	13	14	14	15	15	71
CAR	72	81	91	101	112	123	580
Chad	70	85	112	154	186	219	826
Congo	0	56	65	74	86	95	376
Côte d'Ivoire	366	402	441	482	525	571	2 787
Equat. Guinea	0	0	11	12	13	14	50
Ethiopia	0	0	0	1 071	2 025	2 229	5 325
Gabon	32	35	39	43	46	49	244
Gambia	24	26	29	31	33	35	178
Ghana	337	394	454	503	541	596	2 825
Guinea	0	162	179	203	228	262	1 034
Guinea Bissau	0	22	26	30	33	36	147
Kenya	0	0	627	765	911	1 002	3 305
Liberia	0	55	76	85	97	111	424
Mali	240	284	312	346	382	409	1 973
Mauritania	47	52	61	70	76	85	391
Niger	97	160	206	255	307	363	1 388
Nigeria	2 445	3 028	3 385	3 869	4 271	4 579	21 577
Rwanda	91	131	174	220	367	383	1 366
Sao Tome	0	4	4	5	5	5	23
Senegal	171	197	220	244	270	297	1 399
Sierra Leone	0	136	146	155	164	176	777
Somalia				no data available			
Sudan				no data available			
Togo	80	91	111	123	136	150	691
Tanzania	0	0	1 133	1 101	1 179	1 246	4 659
Uganda	0	0	690	732	776	832	3 030
Zaire	0	0	0	1 279	1 482	1 676	4 437
No Infants	4 488	6 323	9 817	13 351	15 817	17 284	67 080
Coverage	50%	59%	67%	72%	78%	83%	

Cost x $ 1000	1995	1996	1997	1998	1999	2000	1995-2000
Vaccine	1 870	2 634	4 091	5 826	6 590	7 201	28 212
Syringe/needle	229	322	501	713	807	881	3 453
Freight	187	263	409	583	659	720	2 821
Serv. Del.	1 706	2 402	3 731	5 313	6 010	6 568	25 730
TOTAL US$	3 992	5 621	8 732	12 435	14 066	15 370	60 216

This total (60 216) excludes surveillance and operation costs