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REPORT

OF

CONSULTING EPIDEMIOLOGIST

FOR

BLUE NILE HEALTH PROJECT

SUDAN

SUBMITTED BY

HENRY NEGRON APONTE, MD

DIVISION OF ENVIRONMENTAL HEALTH

CENTER FOR ENERGY AND ENVIRONMENT RESEARCH

UNIVERSITY OF PUERTO RICO

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REPURT OF CONSULTING LPLULKIULOGIST FOR

BLUE HILL HEALTH PRODECT

by

Henry hegron Aponte, He.

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Puerto Rico Sevartment of Health and

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Center for Energy anc Environment Research

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I, Introduction

?The Glue Nile Health Project 1s divided into 3 zones. In the Rahad Schene presently available control measures will be used to prevent malaria and bilharzic transeission from becoming 2 serious problen (Hap 1). In the 2 million acres of the Geztra-Hanagli Schece, improved methods and strategies will be gradually applied on an operational basis, as they becone avatlable from present knowledge and from the Study Zone (Table 1). The Study Zone near Abu Usher in the northern Gezica will be given an intensive epidemiological baseline survey in 1980, before Introduction of an integrated comprehensive control strategy to decrease the water-assoclated diseases. The Study Zone includes 55 villages in blocks 26 and 27 of the Meheretba Council on Wadhabuba Group IV* where control will be started in 1981, and 28 villages in other parts of the Gezira, Hanagil Schene, which will be monitor area (6-H) (Untreated Surveillance Areas until 1985).

his consultant participated in the planning sessions ané this ceport cover the period during and after the meeting of the First Scientific Advisury Group (SAG-1) for the Blue Nile Health Project. It includes specific recomendations fon Ltens not completely covered in SAG-1, the size of epldeniological samples to be taken In each Zone, the manner of selection of the samples, the timing of the sampling and the age-groups to be Involved. These recommendations are dined at achieving the most cost-effective manner of evaluating human disease transmission An the Project.

For evaluation of bilharzia transmission, the most useful and sensitive measure of changes in transmission will be achieved by a yearly prevalence

survey of a specific age-group with the measurement of the rate of passage of schistosoma eggs/gram in the excreta. From this, it will be possible to caleu-late the total schistosome egg-cutput of the human population in the endenie zones. This parameter is more Useful and reliable than estinates of incidence

?See Appendix 6.

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LOCATION OF BLUE NILE IRRIGATION SYSTEMS AND PROPOSED PRI

GEZIRA-MANAGIL,

J ?SCHEME

juneid Scheme STUDY AREA

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?and more sensitive to changes in transmission than is incidence or prevalence,

which could be due to therapy or other control measures.

IZ, Coloulation of sample sizes

The following calculations indicate the estimated numbers of persons and

villages to be sampled the estinated work load and nunber of microscopist needed.

As Rahad Area

From the Rahad area 8 villages from 30 have been selected from which

2 sample of 10% of the people and atl the school children should be tested

for malaria, 9. sanzoni

haenatobiue and other parasites, as recommended

at SAG-I. I recomend that the concept of village area should be applied.
A census of all the people in the village areas should be made and maps
with households and menbers of families should be prepared.

The census sheet shown in page 2 will be the document where all parti-
elpants, their personal information and results will be collected on each
survey (Yearly). This document will be used by the statistical unit for
follow-up tabulation and analysis (should be in cardboard).

The persons who perform the census can use the same data sheet in plain
mmineograph paper and the sample collectors can also use this sheet, which
should go to the laboratory with the sample.

Each sample should be appropiately identified with the number that

consists of: Area number-one digit, Rahad=l, Monitor=2 and Study Zone=3;

Block Nunber=Three digits; Village area nunber-Two digits; Household
umber-Three digits and Household menber nunber=Two digits (trom 1 to 10
oF more). This will give an eleven digit identification nunber for each

participant.

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The census sheet should have the nane of the person doing the census

?and collecting the samples. Date of census, collection of samples and Laboratory testing should be noted, as well as the village area nane. Elght village areas in the Rahad will have a population of 8 to 10,000 People. From 10,000 people the age group of 2 to 9 years would have a Population of aupronimately 10 x 258%2,580 children. The nunber of slides

to be derived from this population will be 2,580 x

2,900 slides. This
work will be performed by two microscopists in one year.

The 2 to 9 years age group is preferred for evaluation as it is a total Population segnent where all people are to be sampled and should give a better answer than a 10% percent sample which could be very variable and erratic since these diseases (malaria, schistosomiasis and other parasites) are not homogenously spread throughout the population.

If the rest of the population is to be diagnosed for treatment purposes, a5 a preventive measure and the moneys to buy drugs are available, then the whole population needs to be examined,

If the purpose 1s to determine when autochthonous infection to Rahad starts, I recommend that you keep expanding the sample by age groups as your capacity to hire and train mleroscopists increases and at the sane

tine treat all positives as they are found.

A vertical sample of the population should indicate who is passing the greatest nunber of eggs, but you mist corroborate this fact with water pollution and water contact practices of these individuals with high egg counts. Are they, the main contributors to the continuity of the parasite cycle?

?See Appendix 1.

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Higrant workers coming to Rahad during the months of January and February ?amount. $0,000 or an increase of half of the population which exists there now (90,000). The malaria programme treats all migrant Labourers that ?cone in through the official hiring systen.

For schistosoniasis several questions must be answered: Where do they cone fiom? Is thetr place of origin endenie or not? To what disease? Have they been to the Gezira or any other endente area before? On the basis of these questions, a decision mst be taken whether to make a Aiagnosis on him or not. AS a means of checking the truth of their answers, to the above questions, I would test @ percent of the supposedly negative population to verify the assuaption.

The first year in the Rahad, since there are no snails present in the irrigation systen, I would investigate the cost and tine of doing diagnosis

and treat selectively vs. the cost and time of mass drug treatment of atgrants.

In the malaria programme during October 1978 in seven villages surveyed within the Rahad, out of an approximate population of 75,000 people, a sample of 824 children were found to have a positive rate of 0.9% for parasitenta, Iwas informed that during 1979 a positive rate of 20% was found, but there are no detatis on the type of sample taken and where or who were the most severelly affected. Dr. Haridi will investigate.

Dr. titamid Anin 1s training 10 oF 11 microscopists for the Rahad Area starting Novenber 10 or 12, 1979. With this number of microscopists in

Rahad they will be able to produce 10 x 5

00, 500 x 20=10,000 siives/

month or more which would be about 2,500 individuals tested for S. mansoni

?end haematobium where 4 slides would be processed per individual. In 2 ?months of work 5,000 individuals can be diagnosed, that, probably would

be the anount of migrant labour present In the 8 selected viMages.

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Te may be mentioned that one of the villages sampled by the malaria programme has 2 to 3,000 inhabitants, {t is an old established village and Ats name 15 Khiari, This 1s the maximum size village which the Programe should be Involved with, unless there is no other choice and transmission is present.

8. Monitor azes (Gezira-Hanagil)

The consensus of the opinion in the Scientific Advisory Croup was for the survetllance sample to be taken in 28 village areas fron the 18 Groups of the Gezira-Hanagii Irrigation System (Total villages 1,936).

After examining the prevalence survey performed by the malaria progranne, where 9 councils and 29 villages within them are sampled, deriving fron each fof then 20 to 100 slides from children of 2 to 9 years of age, it appears that this sample Is insufficient for malaria as well as for Schtstosomtasts (See Appendix 4).

The following 1s reconeended for the Cezira-tlanagil Irrigation System 425 2 mninal monitoring sample (if finances permit, larger number of villages should be monitored): from 16 Croupst a Listing of existing Permanent. registered villages with approxinate population from Malaria Programme should be made and located on 2 np of the Cezira Board. Tao

villages from each Croup should be selected in the following manner:

NOTE: ALL villages or towns with more than 3,000 population should be excluded from this selection. Reasoning: towns with more than 31000 people are too complex in thelr mobility, have a better socio-economic status and are less than ten percent of the total Villages in the Geztra-Managil Area.

*GroupsIrrigation Block Area-Not to be confused with Councils.

(See Appendix #6).

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Select from a random table the number that will correspond to the first village and locate it in the map for each Group* Once the first village 4s located in map, select the village that is farthest away from the first,

a8 the second village to be monitored in that Group (Reasoning: if both

Villages are selected at random they might be next to each other and an even distribution of the monitoring villages would not be possible. With such a small number of villages to monitor, an even distribution should give the best estimate, Otherwise a representative sample (which would be too large and with the available information inpossible to select) would

have to be procured in tine).

The 28 villages would yield 2 population of approximately 28,000 people:
28 x 258-7,224 children. Thus the sample size for the 28 village areas
(of 2 to 9 year old children) would be 7,226. 7,224 children would generate
7,224 x 536,120 slides. One alcroseopist reviews 50 slides per day and

An nine months he would review 50 x 1

00 stides, therefore 2120"

5:16 or atx (6) alerossopsts re rede to perform te work drive fron

28 village areas sampling 2 to 9 year old ehilorn, tn one year Teo

vonths of the year these miroscpists eau be moved te the Stuy Are

Wo help do the survey of the mucant Labour Damar and Febeae

WIE: the aleronupits are caleslated onthe basis of creping the wuek
load generated by the surveys performed and cam be used for other
servloe in fospltals or health enter If seh a regonibiity
Ss olen to then, sone arramenent mst Be made to FFL the
comnitnent of the Stuy Area and the monitor aFea work Loads

hve not fen in consideration the existing malta programe

microscopists, since thelr present participation in the annual

?See Appendix 6.

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Prevalence survey Is Limited to 5 mlcroscopists for 10 to 15 days.
The rest of the time they are doing slides from hospitals and health
centres from people who have fever and are suspected of having
malaria (case detection).

C. Study Zone

?Accerding to the malaria main office, Wad Nedani, the blocks have the

following characteristics:

Block 26
Registered viilages 2
Unregistered villages ?
Office of beidges (block) °
Total population 19,748
No. of families 3,209

Block 27

Registered villages uv

Unregistered villages 6

Offices and bridges (block) 9

Total population 10,470

No. of families 1,939

If twenty villages areas are to be selected from the existing fifty registered villages and the surrounding unregisted villages, temporary labour camps and scattered thatched households. That would be 40% of

the village areas in which a sector of the population would be monitored (2 to 9 year olds An the existing households). The age group of 2-9

yoar olds was selected to test for malaria from the malaria data (Or. Haridl see Appendix 2 and 5). The village areas are mapped and the house-holds are located and numbered. The malaria spraying data is used to

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identity families Living in households and a census to obtain pertinent Anformation is conducted. From this census the households and famtlies

to be examined in each village area are marked and the population deter-

mined (2 to 9 year olds).

?An estimate of the population to be examined in the Study Area is as follows:

Block 26 has from 20,000 to 24,000 (in 23 villages) permanent population (from malaria spraying data), 6,000 migrant transient labourers (fellata te.) are estimated,

Block 27 has from 10,000 to 16,000 (in 17 villages) permanent population (froa salaria spraying data), 4,000 migrant transient labourers are estinated,

Thus for the permanent population a minimum of 40,000 people and a maximum of 50,000 people In 40 villages in blocks 26 and 27 are estinated.

The nunber of children to be examined of 2 to 9 years of age would be:

408 of 40 x 258

1128 oF 4O% of 50 x 2564-20 x 258%=5,160

One blood sear for malaria is taken. One faecal sample for ova and parasites 1s obtained and une urine sample S. haematobiue is collected.

?See Appendix 1 for Life Table Estimate. 258 children per 1000 population.

The amount of slides derived from the samples is as follows:

fos slides

Molaria 1

S. mansoni 3

S. haematobium

Total Number of slides per person 5

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In the Study Area for the permanent population, the total nunber of

slides to be collected are:

Max. 5,160 x $225,500

Min. 4,128 x $220,640

One microscopis: can review 50 slides per Jay, so the nunber of slides

reviewed in nine months will be 50 x 140=7,000 slides.

To review the slides of the Study Area, we would need a minisun of:

25800 « wioroscophets

During the months of January and February when the aigrant Labour is

poking cotton all activities should move tovards this population. If
ve eatinate that there will be 9 population of Labourers in the Study
Area of 10,000 people, the available four microscopists should be able
to process 8,000 slides during the two months. Ths would anount to 17%
of the work Load of slides that can be derived from this population. For
malaria no slides need be taken and all stould be treated wen they cone
sn the area.
for Sehistosoniaels mansoni and haematobium, the persons will be qes-
Uioned suring Une census as to thee place of origin and If they have beer
vo the Geelsa or other endenic arces before. According to information
otven in Sudan this mould eliminate approximately 30-40% oF the population
Arthough a sample of these soncalled negative should he done to ascertain
the Judgenent. This mould Leave 6 to 7,000 people to examine, 4¢ four (6)
sides are derived per person, that would mean that the & mleroscopists
could do one quarter of these simples, and the mlcroscopists would have

to be increased to 16 during two months.

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Probably during the first year of work and investigation should be
performed to determine if it would be more economical (depending on the
cost of drug) to treat them all at the very beginning, since it is known
that S. hsematobiue is more prevalent n this population. This say help
to bring dows cost of control with Hetrifonate.

Tt also may be possible that during the two months (January and February) of cotton picking when the migrant workers are present in the Study Zone ?the microscopists of the monitoring area and quality control can help to do the whole work oad in the Study Zone,

9. Quality Control

The malaria program reviews all positive malaria slides and 10% of the negatives, This system should be continued for the three diseases involved

(walaria, Schistosomiasis

yenatobium and mansoni) therefore a special

Group should be established to perform this responsibility (Directed by Dr. asim Hussein or Dr. Osman Zubelr).

1. The anount of malaria slides derived from Rahad, Monitor (G-M)

and Study Area will be the following:

Area tusber of 2 to 9 years old

fahad 2,580

Monitor (G-M) 7,224

Study Zone 5.169

Total Malaria 14, 968

Slides per year

Positive malaria slides to be reviewed:

14,964 x .186*=2,783 slides

Negative slides to be reviewed:

(14,964 ~ 2,783) x .10=1,008 slides,

Total malaria slides to be revieweds:

1791 slides.

?Average percent of positive for malaria in 2 to 9 years old fron life

curve and malaria prevalence (Appendix 1 and 3).

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2, The anount of positive S. manson! slides derived from Rahad,

Wonitor (C-M) and Study Areas will be the following:

?rea Nunber of positive 2 to 9 years old

Fahad 2,580 x. 20% x 3 516 x 35 1,548

Wonttor {G-H) 7,224 x .3524* x 322,549 x I= 7,629

Study. Zone 5,160 x 35244 x 31,816 x 3- 5,489

Total 5. nansont =I, 626 slides.

positive slides

to be reviewed,

Negative slides for S. mansoni to be reviewe

(14,964 x 3)-14,626 x .10-3,027 slides.

Total S. mansoni slides to be reviewed -17,653 slides.

* Estimated 208 prevalence for Rahad.

?*Average percent of positive for

mansoni in 2 to 9 years old

from Life curve and S. mansoni prevalence (Appendix 1 and 2).

3. The amount of positive S. haematobium slides derived from Rahad,

Monitor (G-4) and Study Areas will be the following:

A Number of positive 2 to 9 years old

Rahad

Nonitor (6-H) 14,964 x .10**#=1,496

Study Zone

Total §, haceatootas ase arte ?

positive slides to be

reviewed.

Negative slides for S. haematobium to be reviewed:

(14,964 ~ 1,496) x .10-1,397 slides.

Total S. haematobium slides to be reviewed = 2,843 slides.

?See Appendix 5.

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4, The amount of slides to be derived in two months from migrant labour

An the Study Zone will be the following:

Average $. mansoni slides =7,500 x 3-22,500 slides.

Average S. haematobium slide:

1500 x 1= 7,500 slides.

2,000 x .15*

Posttive slides for Se mansont 300 ses,

Positive slides for S. haematobium: 7,300 x 202,250 s11des,

Total nuner of positive aiden Uo Be revlened 5,550 sors,

Manor of negative slides to be revieneds(29,500 = 5,550) x 102,395 slides,

Total nunber of slides from algrant Latour to be reviewed in the Study Zone = 7,945 slide.

reviened wlll bes 3,791 + 174659 + 2,68) + 7,98522,292 sllde s,

To review thse slides we would need: 2222 « 5 wicrossopists.

NOTE: Only the Study Zone grant Labour slides WILL have quality control done, unless there 18 ore persconel to perform the test and this trlol shows that under the LinitatLoe of tise Azo the therapy telal for atorant labor v2. dlagnosis and therapy frum the polnt of view of cost and tine shuld be considered.

The total number of microscopists per year of work load is as follows:

Rana Area z

Monitor Area (C-#) ?

Study Zone ?

quality Control 5

Total 17 wleroscapTats

?From C. Ht. Teesdale and H. A. Amin (Appendix 5).

s*Percentages informed by Or. My A. Amin.

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Timing of Sampling and Laboratory Facilitée:

Timing of the sampling will have to depend on the avatlable personeti to

Procure, and process the samples. The econymical problem which will init

sample size will Limit timing.

Prevalence and egy counts per gean of feces each year should answer all

epidemiologica? questions, insofar as evaluation 1s concerned, as long as all

OF near all people selected in the sample are tested. If nore than one surveys

are done per year, seasonal transmission can be assessed, if present. This

could be s0, for malaria and for S. haenatoblua, specially during or after the

Fainy season, but not for $. mansonl. In the Study Area where intense surveil

lance will be important and if the economy permits, a prevalence, incidence

and e99 count per gran of feces would permit a more thorough analysis at double the cost. Furthermore it would give sone good training to the personnel and ?organization of the task would be Improved for future years. The excess Personnel would be use to Increase the age group studied and also Follow up cohorts. This is all hinged on economies (money).

The laboratory facilities should be at Rahad for that area, Abu Usher for blocks 26 and 27 and at Wad Hedani for the Quality Control. If possible, for the Honitor Area (C-1) the mtcroscopists should be located strategically, so that travel time would be minimized, It might be feaseable to locate then in Fural Hospitals, with the provision that services to the Hospitals should be done, iF {t does not interfere with the main responsibility of the Peogran.

A centralized laboratory is very ideal as long as transportation and gasoline 41s avatlable since the cost would be increased. The quality of work ond management of personnel! would be improved in a central laboratory but decentra-

Lized Laboratories can be maintained doing good quality of work, when quality

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control is well done and in time. Continued training and unknown test sanples,

unknown to the microscopists, but known to the central Laboratoy, should be

periodically given to the microscopists from the central Laboratory as part

of thelr routine, to see how well they perform.

Studies that should be done in this Project a9 soon as possibl

A

A comparative study In Dr. Anin's Laboratory of (a) the formol-cther
faecal examination modified by Hs. W. Knight. (b) the Teesdale-Anin

Modi fled Kato method and (¢) the sedimentation method by Hoffman, in eug
passers Of high, medium and low quantity (1,000 +, $00 and 50 egg oF Less).
Approximately 1,000 oF more stools should be run (50 stools/day, one month
for cach test, and 3 months of work for the total comparative trial).

This study mould determine the specificity and sensitivity of ali the
test and would serve as reference for future work, if control is successfull
in the Cezira-Hanagil and Rahad Schemes.

The problem of defining a village area is not as simple in the Gevirs as It Is In Rahad. This 1s very important when you try to evaluate your efforts of control by means of prevalence, incidence and egg load changes Jn the population studied. We know that 2 newborn gives an indication of the hone environment since this is where he spends most of his tine. When he starts to malk within the house and around outside of the house, his environment increases in size, As soon as he reaches schoool age he walks to school and by whatever environment he encounters ia Ms of near his school, the size 1s increased again. Thus as time goes by he, increases the stze of his environnent in relation to various circumstances of his development. If we are to do our evaluation with 2 to 9 years old it would be very inportant to know the size of the environment which they

Tepresent. If the age groups are increased (which would be the most

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logical procedure to increase the sample size) every tine this is done In each community the environment In which the sampled individuals move should be the unit evaluated.

A study of thts complex behaviourial pattern of man should be done to be able to understand the results found by the diagnostic tests.

18 nay be possible to have tenants with land in various areas and they work several days on one area and several days in another. The ase could happen to a Labourer or an anbulatory merchant in a villaye or any adult in the village. Also students of Intermediate and higher educational levels go anay From thelr villages to school. These people's envi connen fare quite large and do not represent their village endenic status.

The data derived from hospitals and health centres should be analyzed and worbidity studies for malaria, schistosomiasis and other diseases diagnosed, should be performed to take advantage of this information for the proper planning of health services, budgeting and distribution of human and material resources. The malaria programme does a lot of diagnosis of malaria throughout the Gezira and I have the feeling that this informatio would help tremendously in the planning of malaria control efforts. The sane can be eaid for other diseases.

Finally I wish to thank ali the people, nationals as well as international and WHO personnel who helped me through these two wecks of work in the Suda

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Appendix 1

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APPENDIX 2

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Appendix

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APPENDIX. 5

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INCIDENCE AND PREVALENCE OF SCHISTOSOMA MANSON!

AN THE GEZIRA SCHEME, SUDAN

CH, Teesdale and M.A. Amin

Faculty of Medicine, University of Khartoum, Suan

Dr. Amin will introduce the Gesira
irrigated area of the Sudan in his paper
?o be read in the plenary session dealing
with moltuseicide control of veetor snails,
want briefly to describe the work being
lundertaken to assess the control mea-
sures from the epidemiological viewpoint
and to relate the results to date

1 must stress the preliminary nature
of these results, since the assessment has
?been conducted for 21 months only, and
4 true indication of what is oceurring
?connot really be expected for about four
years.

?The astesement has been based on stool examination since no immunological test was considered reliable enough. A thick smear technique was chosen after comparison of three methods : the Bell filtration method, the digestion method,

?and a modification of the Kato thick smear technique. This technique differs from the Kato technique in that thick lass coverslips are used instead of poly-?tiylene or cellophane. The glass allows Dpreasure to be applied to the sieved stool sample on a microscope slide in such way that there results a thin layer oC stool in which the eggs are amongst the largest particles. With the light adjucs-c correctly the eggs appear as transparent objects under the microscope and are ?easly visible under low power (x 40)
If eggs are not clear, they may be rolled cover to expose the spine by moving the ?coverslip ; or they may be viewed under

higher power (X 100). Seanning ie done ?at X 40 magnification,

Initial prevalence studies indicated that villagers, though keen at first to & examined, soon became unenthusiastic ?when asked for {urther re-examinatiot, and there would be too large a proportion who would not cooperate in subsequent re-examinations. Evaluation was therefore based on incidence and prevalence rates in younger schoo! children, aged 7.10 years

However, as can be seen from Table 1 and Fig. 1, prevalence of the disease was so high in these children that there were too few children found negative to constitute sufficient numbers to make up nef

---Page Break---

cohorts for future examinations in in-
idence studies, unless a very large nam:
ber of schools were ineluded in the study.
?The personnel required for this work was
?ot available and, instead, it was decided
to investigate the 3.6 year old pre-school
children in certain villages to help make
?up the negative cohorts. Tt ix important

to note that prevalence was higher in .
area where chemical control (by Fresco,
was to be applied

Schistosoma haematobium infection
tended to be focal und generally very
?much less prevalent that S, mansoni infec

tion and was not included in the astess-

?ment (Table 2)

TABLE 1, Prevalence of Schistosoma manor! infection in Geter aged 3-10 year tthe

Contot non-treated arce

3 ah

o on

% nor

Pi ny

mt sa

TABLE 2. Prevkace of Schitoxma hovmuroham infection la Gea

hile age wp to 10 years in the later prt of 1973

lot ELH

?aa

ei Steine

EtAunig

ExGemabi

Prot, Tat. Cont. Shino 8)

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26

si CM. TEESOALE ane MLA AMIN

snd reversions (+ to ?) are considered

(Table 4), a trend towards a reduction in

Devalence in the treated area is evident,

?This must be held in light of the fact that

there was a higher prevalence rave i

treatment aren originally. ?The trend

the non-treated area is for ® rise in pr

valence.

FE 4. Prevalence of Schivosom mnon! a Geta wha! eileen ere and 2) months er

Comerion | Recnian | reine 1995

? sw re

TAB

?+ belaing of assesment,

aaa

metas and | Poatuee 1973

ro eswaminee |"oe

eins |S,

treated ses ae

Stree se ia

Table 5 presents the findings on re-

?examination of those children that were

positive at the outset of assessment, Once

?again the trend is for a reduetion in the

intensity of infection in the treated area

latest of lfction with Schusoioma mansoni la Geta school tiden

21m afer the begining of the ast,

% some US

compared with the area where no moth:

eicide hes been applied. except for one

village (Aidaid) which shows an increas

In intensity of tafection as measured by

exe load.

I ing fe asec

?weaed en

?Gems ue

Bir eg s

Aas me

Sere Boys 2

Seroha Gus u

Rita Bove 7

?Auld Gir, i

Preliminary aasessment of the mol-

Juacicide control measures in the Gezira

lrrigated area in the Sudan by a thick

smear stool examination technique indi-

cates that after only 21 months in «

Pree, tat Cont, seer. sn)

130 sex

ee So

ie 1

By 6

ie ?@

ou rs

a $2

longitudinal study there was reduetion st
prevalence where chemieal has been ap-
plied to the canals. Intensity of infection,
measured by egg loads has also dropped
im the treated area, while in the non:
treated area prevalence and intensity of
Infection are rising.

---Page Break---

7

?To obtain stools trom school ehildren
Was relatively simple since discipline 1s
strict and the teachers are very willing
to cooperate. If, however, child was not
?ble to produce a sample no pressure wa
ut upon him to do so and it was cole
lected on a subsequent visit.

For the 36 year old children it was
ecessary to number the houses in the
Village and approach each one in turn and
?sk for cooperation. Each child was giver
f card bearing his nazae, aze, serial nua
doer and house umber, and ine was asked
to deliver bis sample to the dispensary
fm the container provided. Older brothers
tnd sisters were asked to help whenever
otsible and on arrival with the stools
the children were rewarded with sweets
?Those unabie to produce a sample wero
also rewarded #0 as to minimiae the pro-
?duction of borrowed or animal stools in
order to obtain the reward. Without the
sweet aystem the response was very poor

?and the success of collection depended very much upon it,

?Three slides with 25 ing of stool » examined for each stool specimen, If th sample was negative another three slides Were examined from a subsequent day's stool and this procedure was repeated on 8 thin day before a child was considered negative. For re-ussessivent after every 6 months only one stool was taken of account of the work involved. But in the final assessment three stools will again be examined to identify negatives,

?The aseessment of the 36 year old children began six months after that of the school children and it is considered 100 early as yet Wy place any significance on the results collected so far. The results of the remaining tables therefore involve the school children only 21 months after

?the beginning of the assessment period.

Table 3 shows a difference in the i
nee rates of about 107 between the
treated and non-treated ares. This does
rot appear significant. However, when
the number of conversions (? to +)

TABLE 3. Inience of Schistosoma mnsn infcan a Geren shoot citiren 21 month aftr being denied a apt.

Sanna

No. seatve

?wigally

Uneaten

od Sat Boye

wat Suh Gat

No, examined

ate Simos

Incidence 2,

No. poive

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APPENDIX 6-1

Gezira-Managll Irrigation System

(Gezira Board Irrigation Groups)

Group Number Block Block Name Nunber of Village Areas

?and Wane Nunber

1 = South 1 Heg Absalla

2 Fanat

2 EL Guubshan,

Wad taaman

5 EL hosh

6 EL Remetab

7 Wad EL Atat

5 Wad EL Haddad

a

AT ~ Center 8 Hamed Betnti

9 Seed Farm

10 Barakat

1 barwish

121 Kunor

13 EL Radna

16 Abel Hakan

15 EI Medina

10s orga

107 Nur-F1-vin

ae

UII- Messellemia 16 Tayiba

17 EL Siteint

18 EL Tebub

19 Wad E1-Bur

20 Abdel Galit

21 Wad Saadalia

22 Abdel Rahman

23 Wad Hussein

2% EL Nigiana

Sea

---Page Break---

Group Number Block

Number

and Heme

29

APPENDIX 6-2

Gezire-Managil Irrigation Systen

(Gezira Board Irrigation Groups)

Block Nane Humber of Village Areas

Se

IV - Wadhadouba 25 Wad Sulfa

26 dolga 23

27 Istaritna av

28 EL Rukn

10% Wad E1 Fadi

105 EL Hadaat

Se

V = WadeIshail 29 C1 Mulela

30 Feteis

31 Amara Kassir

32 EL Keteir

2 Turks.

38 EL Fawar

VI ~ North 25 Un De Garst

36 De Beiba

37 Turabi

38 Meitig

39 Kade

40 EL Laota

92 Ruweina

oe

VII North West 41 Abu Gin

42 EL Guelz

43 EL Sudetra

EL Faragin

45 Abu Ldeina

46 Bagiga

9% = Wadel ?1 Kereit

98

?Abu Quta

ee

---Page Break---

30

APPENOIX 6-3

Geatra-tanagil Irrigation Systen

(Gezira Board Irrigation Groups)

ee

Group Nunber Ulock Block Name Wunber of Village Areas

and Home Number

a eee

VII-Mikasitt 37 anad Halle

48 Abu Digin

49 rad

86 ad AbD

85 EL Tonsa

26 EL Keratied

97 EL Nassein

Sa

DX-tuda 50 Wad EL Zein

SL EL Malan

52 Shandt

90 Fereigab

91 surnam

93 Cozel Rehia

103 Abdel Magi

eae

23 ? Geltes

5 Ras EL FAL

55 El teins

56 Hab Rowe

58 EL cadia

59 EL Kermit

6 EL Tayer

a

XL-Tahanta 97 Shatter

60 el

th teeta

56 EL Sheweirit

87 Un Shadida

88 Weheiia

8 nate

Sa

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Ge2ir:

3

APPENDIX 6-4

Hanagil Irrigation System

(Gezira Board Irrigation Group)

Group Number Block

?block Hane Number of Vilta

?and Hane Heer

a

elmer

64 Abu Hana

65 Kartoub

66 EL Hashabe

67 Un Higletga

7 Affan

72 Fingeirat

i

MUII-Matut 68 Agouba

EL Tamad

7 e zatir

3 e naytr

7% Et Yebet

75 Rahana

7% Um Sineita

77__Dishewat

rer

XIVecomisi 78 EL aut

79 cabouga

80 Abu EL kettik

81 RanJouk

62 Tuwenat

29 Kuwatit

100 Wa Cetatta

101 sagaat

102 EL Waho

Se

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