ABSTRACTS

Operational research to improve control and potentially elimination of schistosomiasis: The SCORE Program and preliminary findings

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Abstract:

The strategy recommended by the World Health Organization and used in many sub-Saharan African countries for gaining and sustaining morbidity control of schistosomiasis is annual or bi-annual mass drug treatment with praziquantel of school aged children and high at-risk populations. This approach is based on the starting prevalence of the schools or areas to be treated, and when assiduously applied by national Neglected Tropical Disease programs it has successfully lowered both prevalence and intensity of infection as measured by direct parasitologic examination. However, annual parasitologic follow-ups prior to a subsequent year's Mass Drug Administration in large-scale studies indicate that the desired declines are sporadically achieved. Even after 3 or 4 years of annual MDA with sufficient, documented coverage of the target population some locations continue to have high prevalence and in some instances the intensity of infections plateaus, based on eggs per gram of stool or eggs per 10 ml of filtered urine. In addition, parasitologic examinations are known to be insensitive, especially in areas of relatively low prevalence and intensity. These situations clearly threaten the desire to programmatically achieve morbidity control and to move to the goal of elimination of schistosomiasis. Operational research designed to provide national program managers with: 1) better tools for evaluating prevalence; 2) better data upon which to determine the course of schistosomiasis control and elimination campaigns; and 3) plans to deal with difficult to control locations is on-going in multiple sub-Saharan African countries through multiple North-South partnerships under the auspices of the Schistosomiasis Consortium for Operational Research and Evaluation (SCORE: http://score.uga.edu). This presentation will document and define the tools and large-scale studies by SCORE and present preliminary data and conclusions from these highly collaborative studies across Africa.

Research update on the global program to eliminate lymphatic filariasis

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Abstract:

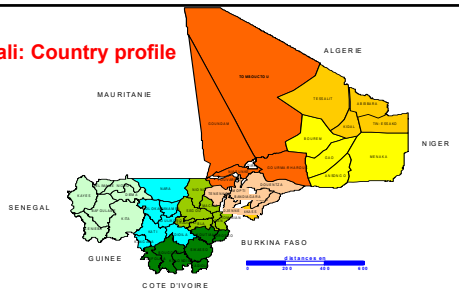
Lymphatic filariasis (LF) is a deforming and disabling disease that is caused by filarial nematode parasites that are transmitted by mosquitoes. China conducted a long program to eliminate LF, and the WHO officially recognized this achievement in 2007. The Global Program to Eliminate Lymphatic Filariasis (GPELF) is now using mass treatment with donated antifilarial drugs to eliminate the disease in all 73 remaining endemic countries by the year 2020. The program is also working to improve care for people with filarial hydroceles and lymphedema. While generally successful, GPELF faces a number of challenges that are being addressed with applied field research projects. This talk will review the current status of GPELF and recent advances in diagnosis, surveillance, treatment, and case management.

Key words: Filariasis; Elimination; Diagnosis; Treatment

INRSP

Institut National de Recherche en Santé Publique (INRSP)
Bamako, Mali

Mali: Country profile



- Mali has a total surface area of 1.246.040 km². The country has three climatic zones: sahelian (50%), saharan (25%) soudanian and soudano-guinean (25%)
- Total population: 14 millions hbts
- The majority of the population is rural (73.2%).
- Main economic activities are agriculture, fishing, livestock breeding and mining
- Poor roads in rural areas, with difficult accessibility during raining season.

Health system structure

Three levels

- Community Health Centers (I)
- District reference Centers (II)
- Hospitals (III)
  - National University Hospital Centers: CHU
  - Regional

Privates

- Hospital
- Clinics
- Pharmacies and laboratories

Research Institutions under MOH

- National Institute for Research in Public Health (INRSP)
- Laboratoire National de la Santé (LNS)
- Centre National d'Appui à la Lutte contre la Maladie (CNAM)
- Centre de Recherche et de Document pour la Survie de l'Enfant (CREDOS)
- Centre National de Transfusion Sanguine (CNTS)
- Centre National de Recherche Lutte contre la Drépanocytose
- Agence National pour la Securité sanitaire des Aliments (ANSSA)

Overview of INRSP (1)

- INRSP was created in 1981
- First National reference Institution for health research under the Ministry of Health
- Staff = 235
- Scientists= 45

Overview of INRSP (2)

- Managment board
  - Council
  - Scientific and Technical Committee
  - Management Committee
  - Ethical Committee
- Financial ressources
  - Government
  - Routine diagnosis and consultation
  - External support

INRSP: The main research arm under the MOH

- Research to influence the health policy
- To review strategy and to improve implementation for HS
- To define approriate strategies and interventions for disease control
- To define indicators for monitoring and evaluation
- To assess both the efficacy and the impact of interventions

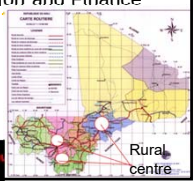
INRSP: STRUCTURES

Departments

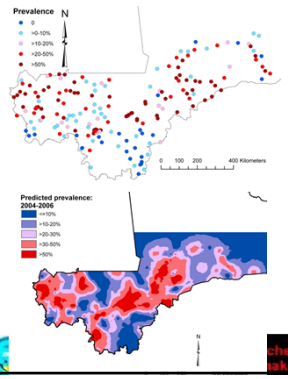
- Diagnostic and biomedical research
- Community health
- Traditional Medicine
- Training
- Administration and Finance

Research centres for rural areas

- Selingue
- Bandiagara (dogon country)
- Kolokani



Schistosomiasis in Mali



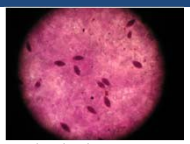
- **In Mali, schistosomiasis constitutes a major public health problem**
- ***S. haematobium* remain the most predominant infection**
- **Transmission very focal and confined to water development activities**
  - **Irrigation area: Office du Niger, Baguineda**
  - **dams area: Selingue, Manantali, Plataeu dogon**
  - **along the main rivers (Niger and Senegal)**
- ***S. mansoni***
  - **Mostly in irrigation areas**
  - **Kita**
  - **Selingue**
  - **Bandiagara**
  - **Bamako**

Main activities during the last 20 Years

- INSRP has more than 20 years in control and research in schistosomiasis
- A number of operational research has been performed by INRSP
  - epidemiology and distribution of the disease (mapping)
  - transmission studies,
  - Re-infection studies
  - Drug efficacy
  - morbidity studies using ultrasonography and immunology
  - Evaluation of diagnostic methods –CCA, CAA, questionaire)
  - Schistosomiasis among children under six
  - Monitoring and evaluation

- Nowadays, the role of the INRSP
  - to provide technical assistance to the program by conducting operational research studies aiming at improving and defining the appropriate strategy
  - To participating to the training activities in the implementation of schistosomiasis control.

Current research and training activities



- **Assessment of PZQ efficace**
  - Egg reduction rate
  - Molecular analysis
- **Training**
  - MSc Parasitology
  - MSc Public Health, University of Sciences Techniques and Technology
  - Supervising PhD Thesis
  - Traning of lab technician at the Medical Secodary school
  - Assessment of Mass drug administration
- **NIDIAG: Development of algorithm for the diagnostic and treatment of NTDs at the primary health care level**
  - Consortum of 13 Institutions level
  - Assessment and development of new diagnostic tools for the control of Neglected Tropical Diseases

Perspectives

- Development and evaluation of new diagnostic tool
  - molecular and immunodiagnostic to improve existing control strategies
- Environment control/ snail control
- Efficacy of treatment
  - Mixed schistosoma infection vs single infection
  - Mixed schistosoma infection and other parasitic infections
  - Development of new marker for drug resistance surveillance
- Chinese experience in monitoring and evaluation
- Capacity building
  - Transfer of technology from China to Africa
  - Training MSc and PhD level
  - Short training
- Diagnostic of imported Schistosomiasis
- Etc..

Parallel 1: Institution-based network on China-Africa cooperation for schistosomiasis elimination (INCAS)

Schistosomiasis in Mali: Overview of the distribution, control and research

Moussa Sacko

In Mali, schistosomiasis is a major public health problem. Both *Schistosoma haematobium* and *S. mansoni* infections are prevalent. The transmission has been found to be very focal and confined to water development activities and along the main river and streams (Doumengue, 1987; Brinkmann *et at.,* 1988).

In several studies, *S. haematobium* was the predominant schistosome infection in Mali (Brinkmann *et al.,* 1988, Traoré, 1994; De Clercq *et al.,* 1994). The disease is widespread throughout the country with an overall national prevalence of 30% (De Clercq *et al.,* 1995). However, there are regional differences ranging from <2% in the southern Region (Selingué dam area) to 60% in area along the rivers Niger and Senegal and irrigation areas. The Niger River Basin (NRB) is one of most endemic area for *S. haematobium*. A nationwide survey undertaken from 1984 to 1994 has shown that 67% of villages (12 villages out of 18 in the area) were found with more than 50% prevalence of *S. haematobium* (Traoré, 1994).

High prevalence of *S. mansoni* infection was mainly observed in Office du Niger and Baguineda. However, infection was found to be prevalent to some extent in Selingué and Manantali dam areas, in Plateau Dogon and Bamako district. In relation to morbidity, no severe pathological lesions have been reported in previous studies (Kardorff *et al.,* 1994a). However, clinical symptoms associated with *S. mansoni* infection including bloody diarrhoea, spleen or liver enlargements have frequently been reported, with higher frequencies among children than among adults (Traoré, 1994).

Schistosomiasis control in Mali

Mali was one the first countries in sub-Sahara Africa to initiate a National Control Program. The control effort started regionally in 1978 in Dogon Country, region of Mopti after the construction of small dams for growing vegetables and became a national programme in 1982. During the first 10 years the programme was supported by the German Agency for Technical Cooperation (GTZ). Chemotherapy based on the use of praziquantel was the main strategy. The programme was first vertical from 1981 – 1996. Parasitological surveys followed by mass treatment of the entire population were conducted by a central team from Bamako. The control has been intensively focused in two major endemic areas: Office du Niger (irrigation area) and Plateau Dogon (small dams' area) (Brinkmann *et al.,* 1988). From 1998 a four year program was approved by the Ministry of Health which involved purchasing of PZQ for mass treatment in the high endemic areas with morbidity reduction as the main strategy. The horizontal approach started in 1996 with the necessity to integrate the control program into the existing Primary Health Care system. The main strategies were community diagnosis and mass treatment in the highly endemic areas conducted by trained personnel from the district and community health centres and individual diagnosis and case treatment at the district and community health centres. However, for a long period, the programme lacked continuous

financial support from the government. Many planned activities have therefore not been implemented. For sustainable schistosomiasis control in Mali, a new plan of action 2004 – 2007 has been implemented.The main objective is morbidity reduction through regular mass chemotherapy with PZQ. Operational research is expected to play a central role in contributing to define appropriate and sustainable morbidity related control strategies and to develop appropriate evaluation and monitoring tools. A number of research priorities have been defined. These include: study of the efficacy of alternative drug (PZQ) regimens for morbidity control, evaluation of the Community Directed Treatment (COMDT) in schistosomiasis control, evaluation of school based control in targeting non school children in mass treatment campaigns, update of the mapping of distribution of intermediate host snails, evaluation of the long term impact of treatment on morbidity and assessment of the level of morbidity among adolescents and adults.

Overview of schistosomiasis research in Mali

Parallel to the control activities, a number of operational research projects have been conducted in Office du Niger, Dogon country, Selingué dam area and Bamako district. These include assessment of the epidemiology and the distribution of the disease (Brinkmann *et al.,*1988; Traoré, 1989, 1994 and 1996; De Clercq *et al.,*1994; Dabo *et al.,*1995; Diarra *et al.,* 2000; Landouré *et al.,* 2003), transmission and water contact studies (Madsen *et al.,*1987; Traoré, 1994; Etard *et al.,*1995; Rollinson *et al.,*1997; Coulibaly *et al.,* 2004), morbidity studies using ultrasonography technique (Kardorff *et al.,*1994a and 1994b; Dabo *et al.,*. 1995, Traoré *et al.,*1998a, 1998b; Keita *et al.,*2001; Sangho *et al.,*2004, Keita *et al.,* 2005) and immunodiagnosis by detection of circulating antigens (De Clercq *et al.,*1995 and 1997). Water contact studies have shown that the majority of contacts are domestic, recreational or occupational and that children have more contact than adults (Traoré, 1994, Etard *et al.,* 1995). The frequency of water contact for domestic and recreational activities was highest during the transmission season when most infected snails were found (Traoré, 1994). Agriculture and fishing were the most important activities during the rainy and post-rainy seasons when few infected snails were found. Transmission studies have shown that areas of high *S. haematobium* transmission are the vast irrigation areas Office du Niger, Baguineda, Selingué, the small reservoirs area of Dogon Country and along the main tributaries to the Niger and Senegal rivers. However, large differences in prevalence within the same ecological area were observed (Traoré, 1994; Vercryusse *et al.,* 1994). *Bulinus truncatus* have been shown to be the intermediate host for *S. haematobium* in large irrigation areas and in small dam area. In the areas around the main rivers various potential intermediate hosts were recorded. These are: *B. truncatus*, *B. globosus*, *B. umbilicatus* and *B. senegalensis* particularly in Niger Basin (Madsen *et al.,* 1987).

The use of ultrasonography in operational research has allowed demonstration of the public health importance of urinary schistosomiasis as a cause of morbidity. Studies undertaken in Niger and Senegal Rivers Basin have shown that *S. haematobium* infection is associated with high morbidity particularly among school aged children (7- 14 years) (Kardoff *et al.,*1994a , 1994b; Dabo *et al.,*1995; Vester *et al.,*1997; Traoré *et al.,* 1998b; Keita *et al.,* 2001). These studies have shown that *S. haematobium* infections lead to severe urinary tract pathology and renal complications. The morbidity

was found to be particularly high in school aged children (7-14 years), half of them having bladder abnormalities and 1/3 having ureteric lesions. Over 80% of all urinary tract lesions are cleared 1 year after treatment among this age group (Traoré *et al.,* 1998b). A study among school children in Bamako showed a reduced school performance and attendance in children infected with *S. haematobium* (De Clercq *et al.,* 1998). Further studies on the long term impact of the effect of treatment on pathology and inflammatory responses are needed as well as the value of treatment improvement in nutritional status needs to be demonstrated.

Field survey on schistosomiasis prevalence with children morbidity in Zambia

Jing Xu

Abstract:

Background: With the increase of trade and communication between P.R. China and Africa, travelers or workers returning with African schistosomiasis have been reported repeatedly in P.R. China. In Africa, sensitive and rapid diagnostic tools are needed in point of care settings due to the significant fall in prevalence and infection intensity of schistosomiasis. This study aims at evaluating the performance of two immunological tests specific to *Schistosoma japonicum* which were commercially available in P.R. China, namely Dipstick Dye Immunoassay (DDIA) and Indirect Haemagglutination Assay (IHA), for screening of *Schistosoma haematobium*.

Methods: A small scale field trial involving 148 pupils was conducted in two primary schools in Zambia, Southern Africa. 10 ml of urine samples were collected twice from each student and underwent microscopy examination after filtration by microporous membrane. Two stool samples from each participant were collected and examined by the Kato-Katz method. Meanwhile, serum samples, separated from whole blood of enrolled pupils, were tested by DDIA and IHA according to blind principle. Parameters of DDIA and IHA for *S. haematobium* diagnosis were calculated using urine filtration and microscopy method as gold standard.

Results: The overall prevalence of schistosomiasis haematobium among the school children was 61.22%, while 31.03% and 35.86% of pupils were infected with ancylostomiasis and ascariasis respectively. Using urine filtration method as a gold standard for the diagnosis of *S. haematobium* infection, IHA performed higher sensitivity (74.16%, 95%CI: 65.07%-83.25%) than that of DDIA (59.55%, 95%CI: 49.35%- 69.75%). The sensitivities of IHA and DDIA are significant higher in 10-14 years old students than those of 7-9 years group. The specificity of DDIA and IHA were 61.40% (95%CI: 48.76%-74.04%) and 71.93% (95%CI: 60.26%- 83.60%), respectively. The co-infection with STHs decreased the specificity of DDIA but had no impact on that of IHA.

Conclusions: The infection of *S. haematobium* is still very common in Zambia and integrated control activities need to be implemented urgently to protect local inhabitants, as well as travelers or workers visiting Zambia from infection. The soluble egg antigen of *S. japonicum* has good cross activity with antibodies against *S. haematobium* and IHA has more potential as an alternative diagnostic tool for identifying schistosomiasis haematobium.

Key words: Schistosomiasis haematobium; Urine filtration; Diagnosis; Immunological assay

Characterization of host-schistosome parasite interaction: Disease burden among paediatrics and their mothers in a highly schistosomiasis endemic district in Zimbabwe

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Abstract:

Background: Schistosomiasis is among the Neglected Tropical diseases now specified for elimination in some areas and for control of the associated morbidity in countries initiating control programs in the African region. About 207 million are already infected and 90% of these live in Sub-Saharan Africa. Morbidity ranges from poor cognitive development in affected young children and reproductive health complications including abortion, ectopic pregnancies, primary and secondary sterility and HIV transmission in the reproductive age. The control of schistosomiasis in the African region is centered on annual Mass Praziquantel Treatment of primary school age children whilst other segments of the population are neglected. However, in order to achieve elimination of the disease it is prudent that comprehensive intervention strategies are employed including snail control and provision of access to treatment to all age groups affected. **Objective:** We are conducting a pilot study to demonstrate the burden of schistosomiasis among paediatrics (children aged ≤ 5 years) in comparison to their mothers, characterize schistosome species, intermediate host snails and to determine the role of malacological studies in predicting disease transmission period.

Methods: This is a longitudinal study being implemented in Shamva district, Mashonaland Central Province, Zimbabwe, with schistosomiasis prevalence data being collected at baseline, 6 weeks, 3, 6, 9 and 12 months post treatment surveys. Snail surveys and determination of patent and pre-patent infection are concurrently conducted at baseline,3,6,9, and12 months representing different seasons. Molecular characterization of schistosome species infecting humans and intermediate host snails will be carried out on urine filtered and dried on filter paper Whatmann No.3 and snails persevered in absolute alcohol respectively.

Baseline preliminary results: Of the 827 women of reproductive age (≥ 18 years) screened for urogenital schistosomiasis, 13.2% had *S. haematobium* ova in urine and 7% of 1343 children aged ≤ 5 years had urogenital schistosomiasis.

Malacology results: A total of 27 water contact sites were identified in the study area. 925 snails were scooped from the identified water contact sites. Of these, 630 (68.1%) were of the *Bulinus globosus* species and 295 (31.9%) were of the *Biomphalaria Pfeifferi* species. Snail shedding results showed that although it was still in the rain season, the water levels were still high and turbid, 3 of the 27 (11.1%) water contact sites were already transmitting schistosomiasis as demonstrated by cercarial shedding (patent infection).

Urine specimens from 827 mothers and 1343 children were filtered through Whatmann paper No. 3 and dry preserved for species characterization and molecular diagnosis of infection. Different species

of snails scooped at each of the 27 water contact sites were preserved in absolute alcohol and stored in labeled 50 ml centrifuge tubes sealed with parafilm for later molecular determination of infection and characterization of host snails.

Conclusion: Our results show that children aged ≤ 5 years and their mothers living in schistosomiasis transmitting areas have the disease burden. Malacology techniques are useful in substantiating the type of schistosome species prevailing in the area and demonstrating if transmission is ongoing at the water contact site at any point in time.

Key words: Schistosomiasis, paediatrics, women of reproductive age, malacology, snails

Prevalence of Schistosomiasis among Basic School Children in El -Qeteena Locality, White Nile State, Sudan (2013-2015)

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Abstract:

Schistosomiasis is endemic in Sudan and reported in all states, It is a behavioral disease which always occurs where sanitary standards are poor and man is the final sole host. School children who live in such endemic areas are at risk of Schistosomiasis as they tend to swim and bath in water channels and get exposed to the infective cercariae. The overall objective of this study was to determine the prevalence of Schistosomiasis among schoolchildren in White Nile State-El Qeteena Locality at the new White Nile Sugar irrigated Scheme during the period December 2014 to April 2015. 480 school children were enrolled in this study. A standardized administered questionnaire was developed and standard laboratory investigation techniques were performed on the urine and stool samples. The collected data in the questionnaire and the laboratory findings were analyzed and the results revealed that 25.6% of the schoolchildren had intestinal Schistosomiasis and. 11.3 % of them had urinary Schistosomiasis. The age group (9-12) years was the most affected with prevalence of 47.2% for intestinal Schistosomiasis and 55.6% for urinary Schistosomiasis. The school children in the study area were largely affected by intestinal Schistosomiasis. According to the statistical analysis there was relation between environmental sanitation and the prevalence of infection. Bad sanitation and lack of healthy drinking water and inadequate number of latrines were the main risk factors associated with the disease transmission. It is advisable to implement the effective control strategies to prevent the disease transmission in such new irrigated agricultural scheme.

Knowledge, attitude and practices towards schistosomiasis among children in Kisantu health zone/Democratic Republic of Congo

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Abstract:

Background: Schistosomiasis is a public health problem in Democratic Republic of Congo but estimates of its prevalence vary widely. Children suffer the most from this infection in Sub Saharan Africa due to poverty and precarious sanitary conditions. This study aims to determine prevalence of *Schistosoma mansoni*, knowledge, attitudes and practices (KAP) on schistosomiasis among children in Kisantu health zone.

Methods: A cross-sectional study was carried out in 4 health areas of Kisantu health zone. 388 children randomly selected were screened for *S. mansoni* using Kato Katz technique and were interviewed using a pre-tested questionnaire to collect information about the socio-demographic information and their KAP regarding schistosomiasis.

Results: The prevalence of *S. mansoni* was 26.5% (103). Slightly more a quarter, 28.6% (111) had heard about schistosomiasis and the main source of information was home 68.5% (76). Only 0.5% knew cause of schistosomiasis and 11.9% identified contact with water polluted by faeces/urine as a risk factor for contacting schistosomiasis, only 10.3% knew that avoid direct contact with river/lake was preventive measure against schistosomiasis. 24.2% always swim/take bath in the river/lake while 21.6% sometimes. 24.7% reported rarely urinate/defecate in water while 9.8 always. Just over a quarter, 27.6% reported never use water from river/lake for domestic use. 94.8% reported never use protective waterproof clothes when in contact with water. Significant association between schistosomiasis knowledge and age ($p<0.001$), attitudes towards schistosomiasis with age ($P<0.001$) and educational level ($P=0.04$). Schistosoma presence was significantly associated to age ($P=0.005$), educational level ($P=0.001$), presence of latrine ($P=0.009$), defecate outside the latrine ($P=0.002$), habits to swim/take bath in river ($P<0.001$) and using water from river for domestic use ($P<0.001$).

Conclusion: This study reveals inadequate knowledge, attitude and practices on schistosomiasis among children. There is a need to incorporate in the school curriculum and community-based health education regarding schistosomiasis for the aim of increasing knowledge and promoting behavioral changes in children to improve disease control.

Key words: Prevalence, Knowledge, Attitude, Practice, Schistostosomiasis, Kisantu health zone, Democratic Republic of Congo

Study protocol of schistosomiasis control and elimination in Zanziba

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Abstract:

Schistosomiasis was one of the local major public health problems in Africa. China has been successful with control and elimination of schistosomiasis. Three pilot sites in Zanzibar will be select to be utilized the successful experience of schistosomiasis control from China. Firstly, the study will carry out the epidemiological investigations and master the transmission pattern of schistosomiasis in Pemba island of Zanzibar. And then, the study will formulate the control strategies and measures for schistosomiasis, and assess the effectiveness, and then select the suitable control strategy and measures for schistosomiasis. At last, the project will establish the standard operating procedure (SOP) for schistosomiasis control, and build the comprehensive control mode for schistosomiasis in Pemba island. These pilot study hopes prompt a comprehensive strategy that could take effect in African countries, and its success will indicate the possibility to eliminate schistosomiasis in the African.

Key words: Schistosomiasis; Control and elimination; China; Zanzibar; Strategy

Snail Control Approaches in China

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Abstract:

Oncomelania hupensis is the only intermediate host of *Schistosoma japonicum*. Theoretically, elimination of snail can effectively interrupt schistosoma life cycle, leading to interrupting the parasite's transmission. Practically, however, it's difficult to eliminate the snail completely in China, especially in the Yangzi River basin due to unpredictable changes of climate and environment and influences of social and economical factors. Since 1950s, snail control has been the key measure in China's schistosomiasis control programme with emphasis on eliminating snails as many as possible in every feasible place. The great achievements made in the control of *schistosomiasis japonica* in China is to some extent explained by successful intermediate host snail control. In all transmission-interrupted areas, the success of schistosomiasis control is attributed to active snail control in combination with praziquantel-based chemotherapy. And in areas where snail is difficult to eliminate, snail control in infection-susceptible zones also is a main measure to protect people from infecting schistosome. Obviously, snail control plays an important role in schistosomiasis control in China. And it is still regarded as a rapid and efficient measure of reducing or eliminating transmission and remains among the methods of choice for schistsomiasis control. In this paper, we review snail control approaches in China, and the distribution and survey of snail is discussed. It is anticipated that snail control in combination with other control measures, most notably chemotherapy and health education, will ultimately eliminate schistosomiasis in China in the next ten years.

Key words: Snail control; Schistosomiasis control programme; Chemotherapy; schistosomiasis elimination.

Elimination of schistosomiasis in China: is the end in sight?

R. Bergquist

Abstract:

Progress from endemicity to elimination of vector-based and other communicable diseases rests on three supporting pillars: reliable diagnosis, adequate treatment and appropriate surveillance. The approach chosen depends on the prevailing degree of endemicity, e.g. when moving from a situation characterized by widespread, high-intensity infections towards elimination, diagnostic sensitivity needs to increase and control tools change from mass drug administration (MDA) to spatially limited, specific responses. The national schistosomiasis control programme in China has been successfully sustained for 60 years, with the number of infected people (first based on stool examination alone and later by serological screening followed by confirmatory stool examination) falling from more than 11 million in 1955 (1.8 % of the total population at the time) to around 150,000 (including chronic cases) in 2014. New, ultrasensitive diagnostic tools have, however, provided figures approximately 10 times higher than those found by stool examination, implying that the real prevalence in the early 1950s could have been as high as 18%. The same calculation applied to the present situation would result in a number of infected people sufficiently high to sustain transmission in some areas despite regular praziquantel treatment. As artemisinin specifically targets immature schistosomes, single doses of both drugs on the same day would have an improved impact on transmission. Effective public health action should thus entail mapping the true schistosomiasis distribution through the use of ultrasensitive diagnostics, procurement of combined chemotherapy in pockets of transmission and continued surveillance with immediate response when residual transmission is detected.

A review of Schistosomiasis of the Genitourinary System in Zambia

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Abstract:

This is a review of Schistosomiasis n Zambia as it relates to the Genitourinary system. It is based on review of work done by the Bilharzia Control program and urologists practicing at the University teaching Hospital over the last 20 years. Schistosomiasis is common in Zambia because the country has a large pool of fresh waters. It has the largest collection of water in the SADC region. Schistosomiasis has a high prevalence in young children below 15 years. There is a high prevalence in the regions of southern province along lake Kariba. The notable genitourinary effects include hematuria, ureteric stricture disease, nephropathies, bladder cancer and genito schistosomiasis.

Understanding the epidemio-ecological factors of persistent transmission dynamics and urogenital schistosomiasis prevalence *in* Mapé dam surroundings schools children

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Abstract:

Urogenital schistosomiasis is a parasitic affection caused by the presence of *Schistosoma haematobium* in the blood vessels, and transmitted to man through fresh water snails. It is very widespread with 112 millions of people infected worldwide, particular in sub-Sahara Africa. The study aimed to understand urogenital schistosomiasis risk factors and prevalence around the Mapé dam favorable settings. Our study confirmed the existence of *Schistosoma haematobium* in pupils in four primary schools children between March-July 2014. Snails and their urine were collected from the dam water and were identified; thereafter, questionnaires were administered to enrolled 229 pupils, gender ration 1.04 (m/f). The prevalence of *Schistosoma haematobium* was 16.6%. Mambonko school site, which is the closest to the dam, registered the greatest prevalence rate of 40%. The age group [10-13[years was the most infested (18.3%) and boys were more infested than girls (21% vs 15.5%). Our findings revealed that epidemio-ecological factors responsible for persistent transmission dynamics included the presence/contact with the dam, traditional fisherman culture, interation between animal-human contaminated Mape dam source of water driking, favorable subtropical climate, landscape of region, residence for at least one year and surrounding villages of 2 km and no access to Praziquantel or other anthimentic agents for the last 2 months Haematuria, urination pain, school absentiesm and poor performance were the major recorded complications in 39.5% and 26.3% males to female respectively. Gender disparities documented is still poorly understood and *Bulinus truncatus* collected from Mambonko site as potential snail intermediate host require further studies. More we advocated that sustained prevention measures, innovative control approaches and strategies are needed both in schools and surrounding communities against *S. haematobium* impacts.

Key words: Urogenital schistosomiasis; pupils; *Schistosoma haematobium,* prevalence; risk factors; Mapé dam

Assessment of the effect of treatment and assistance program on advanced schistosomiasis patients in Jiangxi Province, China from 2009 to 2014

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Abstract:

Schistosomiasis is one of the most important zoonoses, threatening approximately 800 million people in 78 countries with a loss of 70 million disability-adjusted life years. Over the past six decades, China has made remarkable achievements in morbidity control, but disability and mortality control remains much to desire, thus advanced schistosomiasis is a growing problem when on the road to schistosomiasis elimination. Since 2005, China has initiated a national treatment and assistance program to advanced patients, aiming to improve patients' symptoms and quality of life. Here, we conducted a two-phase, population-based study to evaluate the program's implementation and effect on advanced patients from 2009 to 2014 in Jiangxi Province, China. A total of 6 425 advanced schistosomiasis cases were included in this study, and for those having been treated and assisted (90.7%), the cure or improvement rate was over 99.9%, with 668 (11.5%) cases having reached clinical cure and 5 152 (88.4%) cases' condition having improved, which can be partially reflected in the significant decline of the proportion of hepatomegaly (splenomegaly), the degree of liver fibrosis, ascites-related indicators (abdominal girth and frequency of shifting dullness), and portal hypertension-related indices (inner diameter of portal vein and frequency of subcutaneous varicose vein of abdominal wall). Besides, it was estimated to have saved 2 004 years of life lost at total. Therefore, the government should continue support and increase input of treatment and assistance program so that this project can reach more patients, leading to consolidation of achievements of schistosomiasis control and contribution to schistosomiasis elimination.

Key words: Schistosomiasis japonica; China; Advanced schistosomiasis; Treatment and assistance program

Maternal schistosomiasis in rural communities of Nigeria; sociocultural practices and freshwater snails as transmission factors

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Abstract:

The study aimed to understand the epidemiology of urogenital schistosomiasis among pregnant women in rural communities of Southwestern Nigeria. Cross-sectional epidemiologic survey of urogenital schistosomiasis was conducted in 2010–2011 among pregnant women in Yewa North, Ogun State, Nigeria. The women were microscopically screened for infection with *Schistosoma haematobium*. Structured questionnaire was used to gather information on participants' water contact activities. Monthly sampling of freshwater snails was conducted and their genomic DNA was screened for schistosome infection by PCR amplification of schistosome Dra1 gene. Of 313 volunteered participants, 20.8% tested positive for *S. haematobium* infection. The prevalence of *S. haematobium* was not associated with age or pregnancy trimester (P = 0.06), but associations existed between intensity of infection and gravidity (P = 0.001). Multivariate logistic analysis showed contact with water and water usage patterns to be associated with prevalence of schistosomiasis; fetching (P = 0.003) and multipurpose water usage (P = 0.0002) being the most predisposing variables. A total number of 13 snail species were recovered from the water bodies. Of these, *Bulinus camerunensis* and *B. jousseaumei* were reported for the first time in Nigeria with 31.0% as the overall prevalence of infection in snails. The prevalence of urogenital schistosomiasis among pregnant women in Nigeria was high, with younger women and primigravidae at greater risk. *Bulinus africanus* and *B. forskalli* groups are potential snail intermediate host of urogenital schistosomiasis in the area. These data can be used to develop a schistosomiasis control program in the study area.

Key words: Schistosomiasis, pregnant women, sociocultural practices, snail studies,

Study on health education diagnosis and intervention of schistosomiasis re-emergence in Sichuan Province

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Abstract:

Objectives：To carry out systematic intervention to explore the health education work model with the PRECEDE-PROCEED model as the mail theoretical framework.

Methods: We surveyed 6-65 years old residents in the 36 villages for S.japonicum infection. Demographic data was collected from each participant and a head of each household was interviewed about socio-economic indicators, access to water and sanitation, and other potential risk factors. Detailed exposure information was collected from individuals who tested positive from infection survey. The 1:2 matched case-control study was applied, in which gender and age (±2year) were matched. The participants in case-control study were interviewed monthly about their water contact monthly in the past two weeks.706 people in 28 villages were eligible for participation in the intervention study. We conducted a baseline survey before implementation of the intervention ,knowledge and behavior survey in the mid and end stage, water conduct survey three times during four months. We used linear regression to evaluate the impact of the intervention on knowledge scores, attitude scores and the use of personal protective equipment, comparing the intervention to control group at each follow-up period. Logistic regression was used to evaluate the impact of the intervention on defecation practices and water contact. We used Generalized Estimating Equations (GEE) to account for within-village correlation. Regarding model options, robust regression was applied with individuals clustered by village and exchangeable correlation assumed. For each outcome, we calculated unadjusted and adjusted effect estimates.

Results: A total of 2109 residents in the 36 villages were interviewed and tested for *S. japonicum* infection. With increasing age, the infection rate increased, people who were older than 60 years old , fecal positive rate of up to 9.38%. The lower education level received,the easier got infected.From the regional distribution, the prevalence of the reemerging villages (12.11%) is significantly higher than non-reemerging villages.

A number of 503 cattle was tested,the fecal positive rate is 20.77% in Reemerging villages,and highest in cows.The results of our intervention trial showed no statistically significant differences between the intervention and control groups in four endpoints – attitude and three types of behavior – defecation, PPE wearing and water contact. Although, in the first follow-up survey, the intervention

group had a significantly higher score in the knowledge section, this pattern was not sustained in the second follow-up. In sum, no clear evidence was found suggesting any effect of the intervention through intergroup comparisons.On the other hand, both groups showed quite significant longitudinal improvement in knowledge, attitude and defecation behavior, although somewhat greater improvements were seen in the intervention group as might be expected.

Conclusions: Supervision the cow and reduction water contact exposure are the key points for the intervention of re-emerging epidemic situation of schistosomiasis in Sichuan Province. The results showed that occupation-related behavior change was shown to be extremely difficult to change. These findings, while not denying the potentially important role of health education in future schistosomiasis control, does suggest the necessity of exploring new ways of conducting education programs that work more effectively in the current low transmission environments.

Key words: Schistosomiasis ; Re-emerging ; Determinants ; PRECEDE-PROCEED ; Intervention effects

Schistosomiasis transmission dynamics and mitigation strategies in Kenya: novel biological control tools in wetlands microhabitats

Elijah Kem Githui

Abstract:

Schistosomiasis is a debilitating disease of human and certain domestic and wild animals. The infective stage, cercaria, is shed by aquatic snails. The cercaria matures to adult worms in the host mesenteries or renal veins and eggs are continuously passed out in faeces or urine. The eggs hatch in water to miracidia which infect specific snails. However, some snails within the genus are resilient to infection or cannot support miracidia development and are good sinks to trap miracidia. Furthermore, due to their porous body tissue, snails act as good monitors of habitat pollution.

Snails inhabit wetlands that are also the livelihood of the local community's social economic activities including: Fishing, Agriculture, and Domestic water supply and also, the watering place for domestic and wild animals. It is, therefore, an important ecosystem for the livelihood of the community. Tana-river catchment is Mt Kenya and the big tributaries represents many wetlands/ irrigated lands that are high biodiversity hotspot and also area of endemicity to Malaria, Schistosomiasis and also other infectious diseases.

We plan to utilize focal point Schistosomiasis transmission zone in central Kenya rice irrigation mixed farming wetlands where massive drug (praziquantel/ albendazole) administration have recently be applied targeting school children. We will conduct public health seminars on better hygiene practices to limit transmission of Schistosomiasis and mobilize community participation in habitat management in biological control that promotes adaptation of indigenous crab (Potamonautes spp) and apply breeding genetics to confer resistance to infection using competitor snails that do not transmit the infective cercaria. This effort will also contribute in biodiversity conservation of the red list endangered crab and encourage environmental pollution monitoring using these bioindicators.

Moving from control to elimination of schistosomiasis in Africa: progress and challenges

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Abstract:

Recent years have witnessed an increased interest in the control of neglected tropical diseases (NTD). Taking advantage of this new impetus, several countries in sub-Saharan Africa launched their national programme for the control of NTDs, and embarked on large-scale treatment for the four main helminth infections, i.e. lymphatic filariasis, onchocerchiasis, schistosomiasis and soil-transmitted helminthiases. In Africa, schistosomiasis is endemic in 43 countries, and is caused by four species of the genus *Schistosoma*, i.e. *Schistosoma haematobium*, *S. mansoni*, *S. intercalatum* and *S. guineensis*. There are growing efforts to combat this disease, and schistosomiasis control has become a priority on the health agenda. In 2012, the WHO roadmap and the London declaration accelerated the global commitment to overcome NTDs. The change of policy, moving beyond control of morbidity toward elimination of schistosomiasis, through the World Health Assembly Resolution 65.21, was a bold and important step that requires sustained efforts and comprehensive approaches. With a support from governments, international organizations, non-governmental organizations, donor foundations and pharmaceutical companies, significant progress has been made. In 2014, the number of people treated for schistosomiasis in the African region was 52,413,796 from 23 countries. The prevalence has significantly declined in several endemic countries, raising the possibility of their elimination by 2020 if current efforts to scale up interventions for preventive chemotherapy are increased. However, there remain several challenges to interrupt the transmission of schistosomiasis such as expansion of treatment coverage, improvement of clean water supply, sanitation and hygiene, health education, funding for interventions, monitoring and evaluation, and strengthening of institutional capacities and surveillance response system. The presentation highlights some of the key achievements and challenges for schistosomiasis elimination in sub-Saharan Africa, with a special focus on surveillance response system.

Key words: Schistosomiasis, control, elimination, surveillance, Africa.

Parallel 2: Paragonimiasis and other NTDs

Paragonimiasis in Cross-strait - the 150 years' anniversary of Sir Patrtick Manson practice medicine in Takao and Amoy

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Abstract:

Paragonimiasis, a food-borne zoonosis caused by the trematode, *Paragonimus* spp., has a worldwide distribution and predominately in Asian countries. Humans are infected by ingesting infectious metacercariae, after consuming raw or undercooked freshwater crabs, crayfish or shrimps. This diet custom was widespread in the south-eastern coast of mainland China and northern of Taiwan. In 1866, Manson sailed for 3 months from London across the Cape of Good Hope, Madagascar, and finally arrived at Takao (present day Kaohsiung) of Taiwan. In 1881, Manson published a manuscript to descript *Paragonimus westermani* (syn, *Distoma ringer*) in the Medical Times and Gazette. Nowadays, it is the 150 years' anniversary of Sir Parrtick Manson arrived in Taiwan. In the memory of his contribution of paragonimiasis, we used the data mining and reanalysis those publications from 1900 to 2016 in Taiwan. In conclusion, most cases of paragonimiasis were found in northern Taiwan during 1900-2000. As the consequence of public health program, it was almost bare of paragonimiasis case in Taiwan after 2000. Since the improvement of environmental and personal hygiene is deficient in China, a large number of paragonimiasis cases have been reported in recent years. In this report, we summarized the evolution of the epidemiology of paragonimiasis after Manson's arrived, the case report is rare in Taiwan, but the sporadic cases can be found in many provinces in China now. How to prevent the transmission of paragonimiasis in Cross-strait that is the most important issue in the further.

Identification of Immunoreactive Antigens from *Paragonimus kellicotti* for the Serodiagnosis of Paragonimiasis

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Abstract:

Human paragonimiasis affects about 23 million people mainly in China and other parts of Asia, but also in Africa and the Americas. *Paragonimus kellicotti* is this only *Paragonimus* species in North America and is prevalent in its animal reservoirs, but only rarely infects humans. While effective treatment strategies exist, diagnosis of paragonimiasis is often difficult. We identified several *P. kellicotti* adult worm antigens by immunoprecipitation using patients' sera and proteomics as highly immunoreactive antigens with serodiagnostic potential. A full-length cysteine protease (Pkcp-6) of 35 kDa was expressed in *E. coli*, purified and its diagnostic potential was compared to crude total *P. kellicotti* extract. In a Western Blot assay Pkcp-6 was specific for the detection of IgG4 subclass antibodies in 25 subjects with either proven *P. kellicotti* or *P. westermani* infection. The recombinant antigen did not cross-react with sera of 30 subjects with other trematode or with cestode infections or with sera from healthy volunteers. Results showed a similar sensitivity of Pkcp-6 as the crude worm extract, but decreased background. Taken together we have identified and evaluated a specific and sensitive antigen for the detection of parasite-specific IgG4 antibodies that may greatly improve the serodiagnosis of human paragonimiasis globally.

Key words: *Paragonimus*, diagnosis, proteomics, transcriptomics

Opportunity of controlling ‘Ancient’ echinococcosis in the China-Central Asia region with the initiation of the New Silk Road Economic Belt

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Abstract:

A China’s initiative to build a Silk Road Economic Belt and a 21st-century maritime Silk Road, known as the "One Belt and One Road (OBAOR)" strategy were put forth by China. This initiative could involve over 40 Asian and European countries and regions with a combined population of 3 billion.

Echinococcosis has been recorded for a long period in history along the route of north Silk Road, including China, Central Asia (Kazakhstan, Tajikistan, Kyrgyzstan, Turkmenistan and Uzbekistan) and neighboring counties including Afghanistan, Pakistan, Russia, Mongolia and Iran, where historically been closely tied to its nomadic peoples and trade. Echinococcosis has been recently ranked by WHO and FAO as the second and third most important foodborne parasites in the world.

Different echinococcosis control strategies have been applied in China and Central Asia. They mainly include the China model and the WHO model for Central Asia. In 2006, the Chinese Government launched a national program for echinococcosis control, namely, ‘Prevention and Treatment of Echinococcosis Action Plan (2010-2015)’, the largest such program for echinococcosis in the world. In Central Asia, the control of echinococcosis is generally neglected after the collapse of the Soviet Union. The WHO Neglected Tropical Diseases Roadmap sets targets of attaining by 2015 a validated and effective strategy for the control of echinococcosis, implementing it in selected countries and scaling up by 2020.

In this presentation, we are arming to summarize the disease burden, transmission pattern and control opportunities of echinococcosis in China and central Asia with the implementation of OBAOR strategy.

Key words: The New Silk Road Economic Belt; Echinococcosis; China-Central Asia region; Controlling

Progress towards VL elimination in South Asia – challenges and opportunities

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Abstract:

Visceral leishmaniasis (VL) is a protozoal parasitic disease transmitted by phlebotomine sandflies. It is estimated that in 2004 a total of 1,071,743 DALYs were lost to VL in South Asia alone. In contrast to mixed *L.donaovani*/L *Infantum* anthroponotic and zoonotic transmission of VL in China, VL in South Asia remains anthroponotic and caused by *L.donovani*. As a result, VL has been targeted for elimination as a public health problem by India, Bangladesh and Nepal (<1/10000 at subdistrict level) by 2017. A number of targeted strategies have been implemented, namely rapid case detection, effective treatment and vector control using indoor residual spraying and insecticide treated nets, which have had varied levels of success.

As the countries move towards achieving the targets, a number of emerging challenges and opportunities have arisen, both from implementation and research perspectives. We will present an update of the current scenario, with focus on treatment, access, and scaling-up of elimination activities within different Asian countries, and also present emerging challenges such as the identification, quantification and transmission role of asymptomatic infections, Post Kala Azar Dermal Leishmaniasis (PKDL) and HIV-VL co-infection. Approaches for post-elimination surveillance and the importance of developing strategies in order to ensure sustained elimination will be highlighted, such as evolving outbreak detection and response planning in areas of low or previous unknown endemicity. Finally critical upstream research priorities such as diagnostic lacunae, vector bionomics and understanding environmental effects will be defined.

Key words: Visceral Leishmaniasis, elimination, challenges, NTDs

Reasons of perennial urinary schistosomiasis transmission in Kaedi, City located along Senegal River in Mauritania

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Abstract:

Schistosomiasis is the second global pandemic behind malaria. Over 700 million individuals living in endemic areas with more than 200 million people infected, 80% are in Africa. In Mauritania, the transmission of human schistosomiasis is particularly in the southern part of the country where the prevalence rates are higher, ranging from 30% to 70%. The general objective of this study is to determine the reasons for the perennial transmission of urinary schistosomiasis in Kaédi city under climate variability context. Parasitological and malacological cross-sectional survey was conducted in September 2014 and March 2015. The selected school-age children (5-15 years) provided stool and urine samples that were analyzed using standard methods. Molluscs intermediate hosts were collected by two prospectors for 15 minutes per site. The prevalence of urinary schistosomiasis was 2.4% (30/1229) and 4.3% (58/1325) respectively during the rainy and dry seasons. The majority (97%; 86/88) of patients had a low infection. Three intermediate host species of schistosomiasis were collected (*Bulinus truncatus*, *B. senegalensis* and *B. forskalii*). Urinary schistosomiasis is hypoendemic in Kaédi. Despite the low prevalence, the disease is maintained by frequent contact of people with the Senegal River.

Key words Prevalence, Urinary schistosomiasis, Climate variability, Kaédi, Mauritania.

Mitigation of emerging infectious diseases on small scale livestock farms in Vietnam.

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Abstract:

Our research examined the relation between water public health, small scale integrated farming, limited biosecurity, and mitigation of emerging infectious diseases (EIDs) in Vietnam. We collected data from 600 farms in North and South Vietnam (Thai Binh and An Giang provinces) using questionnaires, semi-structured interviews, and water quality testing (*E. coli*, turbidity, and pH). Water samples were collected from participants' wells or rain water cisterns and analyzed in government laboratories using WHO standardized methods. We also used probit analysis to investigate the association of demographic variables with levels of *E. coli* in drinking water and EID mitigation strategies. The typical profile of our participants was a 45 year old married individual with two children, six or seven years of formal education, low income (c. $1200 p.a.), and nine years farming experience. Farmers raised fish, poultry, a few pigs or cattle, and some crops (*e.g.*, rice). Most participants had basic awareness of avian influenza prevention, but very limited knowledge of water-borne diseases such as colibacillosis. Respondents were predominantly male (71%). More than 90% of participants claimed they boiled and/or filtered their water used for drinking (rain or well water). Water test results revealed that more than 80% of samples contained unacceptable levels of *E. coli* (10 to several thousand cfu's). Probit analysis revealed significant association of demographic variables with *E. coli* levels in drinking water, as well as likelihood of farmers to engage in mitigating strategies. Significant predictive independent variables included age ($P < 0.01$), presence of and number of livestock on farm ($P < 0.01$), history of vaccinating poultry against H5N1 ($P < 0.05$), and declared interest in public health training ($P < 0.01$). Levels of *E. coli* in respondents' drinking water are unacceptably high, and although they have a basic understanding of public health concepts farmers are generally not using preventive practices to mitigate waterborne EIDs. Increased awareness of water public health and livestock waste management is recommended. These findings are relevant for public health programs targeting small scale mixed farms in Southeast Asia.

Key words: water public health; mitigation; emerging infectious diseases; small scale farming; livestock management.

Re-emerge leishmaniasis situation in Linzhou county of Henan province

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Abstract:

Objective: To survey the leishmaniasis epidemic situantion in linzhou county of Henan province , evaluate the risk of transmission.

Methods: The data of the leishmaniasis epidemic situantion in the history, and the data of new found leishmaniasis cases in Linzhou county were collected. Epidemiological investigations were conducted in spots.

Results: There are epidemic Kala-Azar in Linzhou county in the history. The highest incidence of 495.98/100,000 was recorded in 1949. 7816 cases and 2006 death had been reported since 1949, died in 2006. No case was reported after 1973. 2 Kala-Azar cases were reported in early 2016 in Linzhou county. Both were children under age 2, who lives in adjacent administrate villages of Yuan Kang Township. The main symptom was fever, body temperature up to 40 ℃, with reduction of whole blood cells and albumin. Leishmania amastigote was detected by bone marrow aspiration smears examination, and rK39 rapid detection of antibody positive confirmed test. No patients with symptoms were found when visited 10 department and wards in 2 hospitals. Indoor questionnaire survey were conducted to in 3658 people in 1236 households, 10 natural villages of 3 adjacent administrative village, no patients with symptoms were found. No positive was found among 20 children under the age 5 by rK39 rapid detection. 105 dogs were detected by rK39 rapid test and 4 positive, which Leishmania amastigote were found by splenic imprint examination in 2 dogs. No sandfly was captured by using mosquito-lured lamp.

Conclusions: There is re-emerge dog-source leishmaniasis situation in Linzhou county of Henan province. Treatment of patients and infected dogs to eliminate the source of infection, enhance training and vector monitoring should be strengthen to interrupt transmission.

Key words: leishmaniasis; re-emerge; Epidemiological investigations

Epidemiology, Impact, Prevention and Control of Nipah Encephalitis in Bangladesh: A Systematic Review of One Health Issue

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Abstract:

Purpose: Nipah virus poses an eminent threat in Bangladesh as it encounters almost yearly outbreak since 2001. Comprehensive and coherent understanding of the disease is of paramount importance due to high case fatality. The objective of this review is to summarize the epidemiology and control of Nipah encephalitis in Bangladesh.

Methods: We searched three different databases- PubMed, Web of Science and Google Scholar using different search term as appropriate for those databases mixing the Boolean operators that yielded 144, 113 and 1530 articles respectively. We screened the titles first for relevance and later abstracts. 47 articles met our criteria and were finally reviewed. A literature matrix was formed in Excel for compilation and analysis.

Results: Nipah outbreaks in Bangladesh were different compared to initial outbreak in Malaysia in 1999. Unlike Malaysian outbreak, person to person transmission occurred in Bangladesh leaving humans most vulnerable. Infections were reported in domesticated pigs, dogs, cats in South Asia and serological study in Bangladesh showed 6.5%, 4.3% and 44.2% seroprevalence in cattle, goat and pig respectively. *Pteropus* bat plays a key role in Nipah transmission and risk factors include drinking raw date palm sap contaminated with bat urine or faeces, eating half-eaten bat saliva laden fruit and close contact or involvement in burial of cases. As date palm sap is harvested during winter, Nipah outbreaks mostly occurred during this season. Nipah occurred within the “Nipah belt” and had a high case fatality of more than 70%. Avoiding raw date palm sap and drinking sap from trees protected with bamboo skirt or “bana” remain the principle preventive measures along with strict infection control in hospitals for prevention of secondary cases.

Conclusion: Extensive knowledge of this emerging zoonosis is the key for prevention and saving lives. Community sensitization and multisectoral intervention through One Health approach can prevent this deadly disease especially in outbreak areas.

Parallel 3: Advance in surveillance response system of tropical diseases - 1

New tools or approaches used in the national schistosomiasis elimination programme in China

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Abstract:

Schistosomiasis is a global parasitic disease that affects over 200 million people worldwide, with a further 800 million at risk of infection. In China, great success has been achieved in the control of schistosomiasis japonica, one of the four priorities for communicable disease control defined by the central government, and the country is moving towards the elimination of schistosomiasis. A large number of new tools or approaches, tailored to the transmission and epidemiological factors of schistosomiasis japonica, have therefore been developed, with aims to facilitate the progress towards the elimination of schistosomiasis in China. This paper describes 9 new tools or approaches that have been applied in the schistosomiasis-endemic foci of China, including harmless public toilets at fixed anchor sites, a machine simultaneously integrating mechanized environmental cleaning and automatic molluscicide, a device for rapid detection of niclosamide content, a snail control approach through coverage with black plastic film, prediction of disease have been established based on mathematical models, an alarming device to intelligently monitor the presence of humans in marshlands, an intelligent detector of infested water using sentinel mice, a LAMP kit for identification of *Schistosoma japonicum* infection in snails, a Web- and Google Earth-based surveillance-response system, and a new health education model among floating boatman and fisherman. The tools or approaches cover infectious source control, snail control, infested water detection, surveillance & response, information management and health education, and the extensive application of these applicable techniques have been found to remarkably improve the efficiency of the control programme in the endemic filed, reduce the cost required for the control programme, and enhance the information availability and management. It is believed that these new tools and approaches will undoubtedly promote the progress towards the elimination of schistosomiasis in China, and will play a critical role in the national schistosomiasis elimination programme of China.

Key words: Schistosomiasis japonica; Elimination; *Oncomelania hupensis*; Snail control; Niclosamide; Health education; Google Earth; Infectious source; Surveillance and response

The value of surveillance-response programs implementation in strengthening national “One Health” strategy and novel interventions against poverty-related infectious diseases

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Abstract:

Surveillance-Response Program (SRP) as an intervention implementation is a holistic and valuable approach in local and national One Health” strategy uptake in sustained control and elimination of poverty related infectious diseases threat and emerging epidemics. It offers effective and reliable indicators towards timely and contextualized operational response/solutions. The paper explores the value and effectiveness SRP in strengthening and sustaining a robust and comprehensive national “One health approach to contextual poverty-related infectious diseases needs and landscape. As a cornerstone approach “What is worth doing is worth doing right” in providing a robust evidence-based knowledge in guiding contextual response options through collaborative and cooperative network from cross-sectional and multi-disciplinary local, national to regional policy-makers, health directors, health planners and practitioners. The paper highlights timely targeted mitigation and adaptation surveillance-response strategies in emerging and infectious diseases of public health importance, preparedness, prevention and elimination in LMICs. Political commitment and financial investments are imperative and essential to support SRP applications in strengthening national “One Health” strategy and innovative interventions in effective care service delivery and management. It is vital in understanding human-animal-environment interplay and mainly in accelerating vaccines preventable vector- and food-borne diseases elimination agenda in most LMICs and Africa in particular. The real time and contextual fitness and adaptation of local or national SRP relies on active and continuous surveillance data gathering for early warning alert, early detection, further investigation, timely reporting and mitigation systems of potential threats and epidemic diseases on vulnerable populations’ and settings. The potential capacity and benefits of SRP to define and establish the minimum threshold or minimum residual threat (MRT) in resurgence or disease epidemic indices, in tailoring new early prognostic and predictive response approaches and tools are highlighted. Improving sufficient access and availability of information and coherent information management system is crucial in addressing the persistent and emerging infectious diseases of poverty public

health burden, participatory vigilance and surveillance feedback, supervision and integrated monitoring systems. The paper emphasizes that integrated SRP implementation is vital based on set of pre-defined and proven standards approach and tools related to its performance. We also showed that its adaptability added value and cost effectiveness in strengthening local, national and regional health systems priorities and planning, promoting early risk / threat assessment and management, enhancing immunization coverage, societal, ecological and economic opportunities. Its uptake, quality performance and effectiveness of SRP in “One Health” evidence-based policy, programs and activities require further joint operational projects aiming at building SRP capacity development and technology transfer, establishing SRP metrics towards instilling local and national empowerment and ownership of "One Health” strategy in infectious disease of poverty sustained control and elimination.
Key words: Surveillance Response System, usefulness, national programs, threat, infectious diseases, Preparedness, elimination, LMICs, Africa

The contribution of water sanitation and hygiene interventions to healthy child growth and interrupting enteric parasite transmission

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Abstract:

Environmental fecal contamination supports persistent fecal oral transmission of a broad variety of human pathogens. Although recent efforts to eliminate intestinal parasites has focused on mass drug administration, as long as there is a reservoir in the environment, infections will persist in the exposed populations. More recently, environmental fecal contamination has been linked to impaired child growth and development. Measures of toilet coverage are a poor proxy for environmental fecal contamination, because many toilets do not consistently separate fecal sludge from the broader environment. Efforts to reduce the burdens of intestinal parasites and to improve child growth and development should include reducing fecal contamination of the environment, in drinking water, in the food supply and on hands.

Key words: Sanitation, child development, handwashing, water

LAMP application into infected snail detection

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Abstract:

To monitor Schistosoma japonicum-infected snail relies on parasite detection by microscopy or sentinel mouse technique, both fail to detect low-density infections. New tests providing early, sensitive diagnosis with minimal need for field evaluation would enhance both infected snail diagnosis and schistosomiasis control activities. In this study, the loop-mediated isothermal amplification (LAMP) kit prepared by our laboratory was evaluated in detecting snail samples from endemic regions of six provinces in China. Microscopy was performed, and then LAMP was performed designed for the detection of 28S ribosomal DNA (rDNA) of Schistosomajaponicum. Polymerase chain reaction (PCR) was performed on all samples as the reference standard. The PCR positive samples were further confirmed by DNA sequence analysis. A total of 232 pooled samples (4006 single snails) were tested in the primary analysis. The results showed thatdetection rate of traditional testing by microscopy and LAMP assay were 0.43% and 6.5%, respectively. Post repeat PCR analysis and DNA sequence analysis of all positive samples confirmed the diagnostic accuracy of LAMP assay. Testing at the Schistosomiasis-Control station demonstrated LAMP potential to serve as a point-of-care test with results available in 60-90 minutes. In conclusion, LAMP was comparable to PCR in monitoring the early infection rate in snails, with a greatly reduced time to result, and superior to expert microscopy, and it might be useful for predicting the risk of infection in the endemic places.

Key words: *Schistosomajaponicum*; Loop-mediated isothermal amplification; Snail; 28S ribosomal DNA; Polymerase chain reaction; Pooled DNA samples

A molecular survey on febrile cases along China-Myanmar border in Yunnan province and the screening and identification of diagnostic antigens of *Babesia microti*

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Abstract:

Babesiosis is a typical zoonotic, emerging disease caused by a tick-borne intraerythrocytic protozoan infection with *Babesia* spp., and it also can be transmitted by blood transfusion. Babesiosis imposes an increasing threat to public-health. To the patients with immunocompromised, the clinical manifestations can be more serious, and even having hazards of life-threatening.

Objective: To carry on the survey on the febrile cases and evaluate the infections of *Babesia microti* in the areas on China-Myanmar border, and the screening and analysis of candidate molecular of diagnostic antigen were related with babesiosis.

Methods: 1) DNA was extracted from 200 blood samples obtained from the febrile patients excluded infections of malaria during June to August, 2014. The molecular survey by Nested PCR applying the primers based on 18sRNA and the beta-tubulin protein of *B.microti* were carried out and all these positive samples were confirmed by sequencing and phylogenetic trees were produced. 2) Construction of the native database on these sequences belonging to Signal peptides, Repeated sequences and homologue sequences between *B. microti*, *B. bovis* and *Plasmodium falciparum* from PiroplasmaDB. cDNA of *B. microti* was extracted from the blood of BALB/c mice infected by *B. microti*,. All of these target gene fragments were amplified from cDNA as a template. The amplification products of target gene fragments were connected with plasmid pEU-His by In-Fusion cloning technology. Finally, plasmids containing the target gene fragment were identified by cloning PCR and sequencing. Proteins were expressed with wheat germ cell-free protein synthesis system after the recombinant plasmids being extracted by extraction kit. The expressed proteins were identified by western-blot technique. The correctly expressed proteins were screened with sera from BALB/c mice infected by *B. microti* in different stages by protein microarray.

Results: 1) By PCR assay and sequencing, 2(1%) of 200 febrile patients with malaria-like symptoms were confirmed to be infections of *B. microti.* According to the sequences of 18sRNA and the beta-tubulin, the clades of *B.microti* detected in our research were zoonotic. 2) There were 222 target gene fragments, and 215 target gene fragments were amplificated successfully by PCR., One hundred and eighty six recombinant plasmids were constructed by In-Fusion cloning ,and there were

167 recombinant proteins expressed successfully by wheat germ cell-free protein synthesis system. Ten recombinant antigens were identified using protein microarray from 167 recombinant proteins with sera from BALB/c mice infected by *B. microti*. These antigens are BmSP44, BmRS8, BmRS21, BmRS28, BmRS29, BmHP33, BmHP37, BmHP41, BmHP42 and BmHP43.

Conclusion: Babesiosis caused by *B. microti* is emerging in China-Myanmar border areas in Yunnan province, P.R. China, where is the malaria endemic area as well. Ten recombinant antigens were identified by sera from BALB/c mice infected by *B. microti*. However, the application of these antigens in immuno-diagnosis in human infections of *B.microti* remains to be further verified.

Key words: *Babesia microti*; Babesiosis; Nested PCR; diagnosis; In-fusion cloning; wheat germ cell-free protein synthesis system; repeated sequences

Guiding Schistosomiasis Surveillance and Control towards Elimination of Transmission: Insights from Dynamic Models

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Abstract:

Basic reproductive number, R_o, is an important concept in infectious disease epidemiology. It has been widely used as a measure of transmission potential of the disease and a reference value of theoretical threshold for control – if control brings the measure below the unity, the disease transmission would die off. However, applying this measure to schistosomiasis and some other environmentally-mediated parasitic diseases faces both theoretical and pragmatic challenges, limiting its potential use to guide surveillance and control strategies. In this paper, we first review challenges and limitations underlying the application of the classic metric in the context of schistosomiasis transmission and control. Extending a previously developed dynamic model of schistosomiasis transmission, coupled with a newly developed individual-based model both based on our study in mountainous irrigated environments of southwest China, we further propose a new metric, *transmission potential*, which integrates both biological and environmental drivers of the transmission, and demonstrate the use of this metric to explore various pragmatic applications in the context of current low transmission environments in China. Some important implications for optimal surveillance and control strategies towards elimination of transmission of the disease are discussed.

Key words: Schistosomiasis; dynamic model; transmission potential; surveillance; control

Involvement of Private Sector's in Malaria Surveillance in Nigeria

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Abstract:

Engagement with the private health sector is essential to ensure complete and timely reporting of all malaria cases and effective case management for people seeking treatment from private providers. However, there is a dearth of research on the breadth of the private health sector's role in malaria case management and reporting. Moreover, there is a lack of knowledge about effective strategies for engaging the private health sector in malaria diagnosis, treatment and reporting in a variety of settings, the challenges malaria elimination programs face when engaging the private sector and ways to address those challenges. This paper seeks to fill a knowledge gap by synthesizing current research and expert knowledge on the current state of the private health sector's involvement in malaria surveillance in Nigeria. A purposive sample technique was used to select respondents for this study and a total of 45 key informant interviews were conducted among experts working on malaria elimination and control programs or private sector engagement. Interview questions were open-ended and focused on private sector diagnosis, treatment and reporting of malaria. Key informants were asked to comment on the role of the private sector in malaria surveillance globally and specifically in Nigeria. Data were thematically analysed. Private providers are often not included in routine disease reporting systems, such as health management information systems (HMIS) and rapid reporting systems, due to lack of knowledge, infrastructure and incentives to participate. Despite the poor integration of the private sector in disease surveillance, Nigeria has a number of successful public-private collaborations to improve access to essential health services and commodities that can serve as a good foundation for improved case reporting. Nigeria has several successful examples of engagement with the private sector for family planning and maternal and child health, which provides an opportunity to learn from those experiences and apply them to malaria testing, treatment and case reporting. The government should leverage the strengths of the private sector, acknowledge all stakeholders involved, coordinate across many private providers and convene stakeholder meetings to provide outreach and education on the importance of malaria surveillance. Efforts to include private providers will need additional supervision systems and oversight to monitor the testing, treatment and reporting of cases.

Key words: Private sector; Malaria surveillance; Involvement

Modeling Surveillance Data of Cholera: Case Studies in Haiti and Cameroon

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Abstract:

Cholera affects millions of people in tropical and subtropical countries with limited infrastructure for water sanitation. Determinants for transmission dynamics are well studied in South Asia, but remain unclear for countries in Central America and Africa. Here we introduce our modeling efforts to quantify transmissibility of cholera and the role of environmental factors in Haiti and Cameroon using their surveillance data. For Haiti, we established a mathematical model for the epidemics in the Ouest Department during from 2010 to 2014, simultaneously accounting for environmental reservoir and asymptomatic infection. The basic reproductive number was estimated as 1.6 (95% CI: 1.3, 2.1). The epidemics could be eliminated with mass vaccination for a range of vaccine efficacies, if the timing of initiating vaccination campaign is right. For Cameroon, we developed a spatial-temporal transmission model at the health-district level for the 2010-2011 outbreaks. Human-to-human transmission appeared dominant over environment-to-human transmission. The majority of transmissions occurred within districts. Interestingly, the effects of temperature and rainfall on human-to-human transmission seem to vary across different ecological zones. In addition to transmission patterns, environmental determinants and intervention effectiveness, these findings also offer insights in what data should be collected in the future to better understand cholera transmission at the population level.

Key words: Cholera; Basic reproductive number; Vaccination; Surveillance; Modeling

An integrated surveillance system for effective control of Lassa fever in Nigeria

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Abstract:

The perennial epidemic outbreaks of Lassa fever in Nigeria, Sierra Leone, Guinea and Liberia are a major threat to public health, socio-economic development, food security and livelihood in these affected communities of West Africa. Lassa fever infects 150,000-300,000 persons annually with a mortality of about 5000, thus constituting a major public health concern. Despite availability of standard treatment and management algorithms, outcomes are inconsistent and Lassa fever remains a major drawback to attainment of Nigeria's healthcare development goals. The latest outbreak, which started in August 2015, already claimed about 137 lives. Although government has made efforts at controlling the disease over the years, most of these focused on diagnosis, treatment and advocacy in the communities. There is no data on active surveillance in humans and the zoonotic rodent reservoirs (*Mastomys natalensis*). In addition, there is no data on viral load in the rodent reservoirs, geographic map of rodent distribution and methods of reducing contact between the rodents and humans. Interestingly, control and management of the zoonotic reservoirs and better understanding on viral load could lead to potential elimination strategies of the disease as a public health problem. The evaluation of viral load and mapping of rodent distribution will provide a pragmatic framework for control of the virus in the zoonotic host and thereby prevent transmission. The studies are designed to provide an urgently needed framework for a national integrated surveillance system to achieve more effective control of Lassa fever in Nigeria. Approaches and methods being developed are designed to improve control efforts for the disease focusing on reducing human-rodent contact and determining viral load in infected rodents. In this presentation, an approach for determination of LASV load, mapping of *M. natalensis* distribution and ecological methods for effective control of the zoonotic rodent reservoirs will be highlighted to seek community inputs into prevention of the disease.

Key words: Lassa fever, viral load, *Mastomys natalensis*, rodent distribution, national integrated surveillance system, Nigeria.

Infestation rates of *Tunga Penetrans* (Jiggers) within the kwale health demographic surveillance system, Kenya

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Abstract:

Tunga penetrans ("Jiggers") is a hematophageous flea which causes debilitating health outcomes such as pain, itching and the eventual loss of limbs through secondary bacterial superinfections including tetanus. It is found throughout Sub-Saharan Africa and is associated with entrenched poverty and poor living conditions. For the affected, there is social isolation, trauma, and reduced self-esteem leading to stigmatization. This research aimed to discover prevalence, manifestation, behavioral and risk factors associated with tungiasis a neglected tropical disease in an area along rural Kenyan Coast. A descriptive cross-sectional study design was implemented within a well-established health and demographic surveillance system (HDSS) to assess all individuals (~35,000 people) within a rural area of Kenya for presence of tungiasis. A survey questionnaire was designed and administered to all household members to gather information on behaviors of tungiasis and past health outcomes. Regression methods were used to test associations of potential risk factors with tungiasis. Location of households by global position system were used for all the household and spatial methods were used to determine patterns of tungiasis. Approximately 1% of people surveyed were found to be infested by jiggers. Males were more likely to be infected that females (1.4% and 0.9% respectively). Majority of infestation were localized at the feet (99%). 86% of respondents reported having attempted to remove the flea by themselves and 95% (420) used unsterilized items including needles and thorns. Most infections 77% were thought to have been obtained at home but some (15%) were obtained at a school. Possible evidence of secondary infections was seen in 66.7% of those infected and the odds of having a secondary infection (OR 6.54 (2.54, 15.58)) were significantly higher for those who attempted removal using other means. Age was found to have non-linear relationships with infection with the probability of having tungiasis rising from infancy to ~10 years of age. Our results support that factors associated with livestock determine the risk of *T. penetrans* infections. Risk of infestation is higher in males than females attributable to possible differences in their activities. The infestation contributes to other secondary infections and stigmatization among the infected people. The jigger menace can be controlled at a very low cost compared to other diseases therefore more research should be done with collaboration with governments' and NGOs to eradicate jigger infections.

Key words: Health and Demographic Surveillance System; Tunga penetrans; Neglected tropical Disease.

Establishing a surveillance response system for dogbite patients averts deaths and tracks rabid dogs in Shimla Municipality, Himachal Pradesh, India

Omesh Kumar, Archana Phull

Abstract:

Rabies is a zoonotic disease that has been included as a Neglected Tropical Disease. Despite one death on an average every half an hour in India, there is no systematic reporting for the dogbite cases or for the deaths due to rabies. There is no effective surveillance system for reporting animal bites or deaths due to rabies, as no proper documentation is done.

We tried to document animal bites in DDU Hospital Shimla in 2005 but no proper system could emerge. In 2008, while doing a study on pooling technique for low cost intra-dermal rabies vaccination (IDRV), it was necessary to record all cases and we started recording all cases that report to the animal bite clinic. In those days there were repeated episodes of stock outs of the vaccine in the hospital as well as in the market. While planning the budget for the next year, we could provide correct estimate of the vaccine requirement based on the patients attending the clinic. This helped us to enable all patients get vaccine at a cost, five times less due to IDRV technique and later free due to low costs involved and hospital administration ready to spend the estimated required budget on vaccines. This could be done because of correct estimates for the required budget due to surveillance system established by recording each and every case in the clinic.

In the year 2014, we were forced to do another study on local infiltration of Rabies Immunoglobulins (RIGs) without systemic IM administration due to non availability of the RIGs in the market. 18 patients bitten by two suspected rabid dogs reported to the clinic. Immediately the Municipal Corporation was alerted and dog squad pressed into service to nab the rabid dogs. Later the brain of one of the dog was extracted by the veterinary doctors and sent for confirmation to CRI Kasauli for FAT (Fluorescent Agglutination Test). The dog was confirmed to be rabid.

Later many dogs, on the identification of patients reporting to dogbite clinic, were tracked and kept under observation and many of them were found to be FAT positive after their death.

Now an unique system of surveillance for dogbite patients as well as tracking the suspected rabid dogs is in place and we have recorded no death in Shimla Municipality since the establishment of this system. Till date, more than 12000 patients have been given Post Exposure Prophylaxis since establishment of this unique surveillance system in 2008 and all patients are tracked for follow-up.

Conclusion: Proper record keeping and establishment of a surveillance system not only helped patients get costly vaccines and RIGs free of cost but also helped track rabid dogs preventing deaths due to rabies. This also helped administration to estimate the costs of treatment and order supplies accordingly to avert any stock outs of vaccine or RIGs.

Sensitivity of the Ov16 Rapid Diagnostic Test kit as a panacea towards achieving elimination of onchocerciasis in Ogun State, Nigeria; A preliminary report of 10 years of treatment with ivermectin

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Abstract:

Measuring progress made in onchocerciasis treatment in endemic areas has been challenging given the need to replace the painful skin snip method. The study investigated the sensitivity and specificity of Ov16 Rapid Diagnostic Test (RDT) and of a Dried Blood Spot (DBS) Ov16 Enzyme Linked Immunosorbent Assay (ELISA) for identifying exposure to *Onchocerca volvulus* in Ogun State, Southwestern Nigeria after a decade of treatment with ivermectin. Five hundred and eighty nine (589) firstline community members who were randomly selected from 32 communities in the 8 meso-endemic Local Government Areas (LGA's) provided whole blood specimen which were tested for IgG4 antibodies against the *O. volvulus* antigen Ov16 using RDT and ELISA.and also stored on Whatman™ Protein Saver cards for ELISA reference testing. A gaussian mixture model and expectation maximization was used to classify Optical Densities (OD) for positive and negative samples from ELISA results. Data were analysed using custom scripts in R and SPSS software. Of the 589 participants, 102(17.3%) and 111(18.8%) were anti-IgG4 and ELISA positive respectively, while 79(13%) tested positive for both ELISA and RDT, with significant difference (p<0.05). Odeda LGA recorded the highest sero-prevalence by RDT and ELISA 45.2% (33/73) 56.2% (41/73) while Abeokuta South LGA recorded the least 0.87% (1/115). Assessing RDT to ELISA, sensitivity and specificity were calculated to be 71.82% (CI 62.44% to79.98%) and 95.2% (CI 92.88% to 96.93%) respectively with a 91.3% agreement. The result obtained provided an information on the sero-prevalence status of onchocerciasis. It goes further to show the efficiency of the Ov 16 RDT as a practical tool for field use in identifying areas of endemicity. It promotes the possibility of incorporating Ov16 RDT as a new strategy in onchocerciasis mapping towards achieving elimination in Africa by 2020.

Key words: onchocerciasis, Ov16 RDT, ELISA, ivermectin, Sero-prevalence, Ogun State, Nigeria.

Long-term sruveillance to detect the infections of schistosomes migrated into Zhejiang Province in P. R. China

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Abstract:

Zhejiang Province was one of the heavily endemic provinces with Schistosomiasis *japonica* in 1950s. After over 50 years of active control, the proveince reached the Schistosomiasis transmission control standard and transmission interruption standard in 1987 and 1995 respectively. New infected endogenous patient (domestic animal) and acute infected endogenous patient was not detected, and infected snails were not found from 1996 to 2015, but there are a total of 1590.06 hm^2 residual areas of snails and 230 imported schistosomiasis cases was found from 1996 to 2015. At present, the endogenous sources of infection have been basically cleared, and exogenous source of infection is considered as a major threat. The residual snail area has been increasing, and imported snails are regarded as a potential risk. So the possibility of schistosomiasis recrudescence still remains according to the endemic characteristics, the integrated solidification strategy with emphasis on control of residual snails and imported cases should be still taken in the future.

Key words: Schiatosomiasis, Transmission interruption, Surveillance

Use of mobile phone for reading rapid tests and real time reporting of results: a useful tool for surveillance

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Abstract:

The use of RDT's (Rapid Diagnostic Tests) for monitoring immune status or current infection have proven to be very useful in the field. However reading and recording the results can be challenging. We have developed a platform whereby we use the mobile phone's camera and an accompanying APP to read qualitative and quantitative RDT's. The APP recognizes almost all RDTs through QR codes which encodes the name of the test, manufacturer, lot, expiration, as well as instructions on how to interpret that particular test, such as embedded standard curves. The results are automatically uploaded into a cloud site. Through built-in GPS, the site registers the location at which the test is performed, the time , and the identity of the phone operator. As such, real time monitoring of testing and disease distribution can be achieved. Since results are photographed, re-interpretation can be done also, and the collected information amenable to "Bid Data" analytics. Other features include anti-counterfeit capabilities, and means of addressing lot-to-lot variations which are common in RDTs, and comparison of tests from different manufacturers.

Key words: Cloud computing; Infectious Diseases; Real time disease monitoring; Remote diagnostics.

Parallel 4: Malaria control and elimination

The progress of national malaria elimination programme in China

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Abstract:

China has initiated the National Malaria Elimination Action Plan, which aims to eliminate indigenous malaria except for border areas by 2015, and completely eliminate it nationwide by 2020. The local malaria cases reduced dramatically and were mainly occurred in two regions, nine counties along the border of China-Myanmar and one county of Tibetan Autonomous Region of China. In 2015 only 40 indigenous cases occurred in 9 counties of 4 provinces which were reduced by 99.1% compared with that reported in 2010. Based on external and internal assessments China was classified in the elimination phase by WHO, and 74.17% of the endemic counties have certified as malaria elimination. However, there still have challenges in the prevention of reintroduction, e.g. malaria importation from Africa countries and borderlines, lack of risk assessment tool on receptivity and vulnerability, sustainability of interventions, and so on.

Key words: Malaria elimination; Progress, China

Evaluation of Current Approach to Malaria Surveillance in Osun State, Nigeria

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Abstract:

Vector Borne Diseases Control Program (VBDC) has made significant progress in strengthening malaria surveillance in Osun State, Nigeria. This has involved developing vertical reporting systems for both government health facilities and Village Malaria Volunteers (VHVs) and using both paper-based and electronic methods for compiling and submitting data reports. The primary aim of this assessment is to evaluate current approaches to malaria surveillance in Osun State and to provide a set of practical and feasible recommendations to further strengthen the surveillance system in the short to medium term. The assessment focused on the surveillance of malaria cases (as distinct from more general surveillance to support monitoring and evaluation) and, more specifically, on instruments and systems to collect, collate, report and analyze malaria data as a basis for informing malaria control policy and practice. This report describes the flow (and use) of information from volunteers and government health staff at all levels of the system to the central level and makes a number of detailed recommendations to improve the system and to address some of the bottlenecks and issues identified. The report also includes an assessment of available surveillance data for 2015 and based on this analysis makes recommendations aimed at maximizing the coverage and utility of the existing surveillance system. Based on this analysis it is apparent that the VHV network represents an important opportunity to effectively increase the coverage of the surveillance system but that an immediate priority is to improve the completeness of the VHV dataset and to develop system for tracking reporting rates. The progress being made towards case based reporting in Osun State is not encouraging and this may be attributed to inadequate funding, manpower, logistics and technical capacity. The system did not really work well at the lower levels and the volume, detail and quality of data being reported by VHVs, midwives and other government health staff was low. Though, the paper-based data collection element of the system was well designed and appropriate for the capacity of the health staff and the case registers provide all data that the state programme requires and are well understood by the volunteers and basic health staff that use them. However, some issues of incorporating VHV data still need to be addressed, the flow of the paper based reports works well and in a reasonably timely way considering the many potential constraints mentioned above.

Key words: Malaria; Village malaria volunteers; Paper-based data collection; Electronic data collection

Comparative study on the effectiveness of the use of insecticide treated nets and other measures for the prevention and control of malaria in Abia State, Nigeria

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Abstract:

A study comparing the effectiveness of the use of insecticide treated nets(ITNs) and other measures for the prevention and control of malaria was done in Ibere community, Ikwuano L.G.A, Abia State, Nigeria using structured questionnaires. Microscopic examination of blood samples was done to determine the prevalence of malaria. A total of 300 persons made up of 123 males (41.0%) and 177 females (59.0%) within different age groups from different villages in Ibere had thick smears of their blood examined for the presence of malaria parasites. Out of this number 176(58.6%) were infected. More females (59.88%) than males (56.90%) were infected. Location wise, Iberenta recorded the highest prevalence of infection (71.40%). The least infection occurred in Ihim(35.70%). The age group 1-10 years had the highest infection rate (68.08%). Regarding occupation, the highest infection occurred among the farmers(75.83%). More than half of the respondents(61.0%) resorted to use of drugs for prevention and control of malaria while some used ITNs(25.33%) and a few a combination of drugs and insecticides(5.0%). Regarding perception about ITNs, a good number of the population(97.76%) were aware of the existence of ITNs. Some did not have the ITNs(69.0%) while a few reported that they were using them(25.35%). Some reasons given for not having or using ITN were that it was expensive (44.33%), not readily available (24.67%) and not convenient (3.6%). To aid the National control and elimination programmes on malaria, it is recommended that the government should create adequate awareness on the importance of the use of ITNs, and put in place monitoring teams to ensure effective and judicious distribution of ITNs to targeted vulnerable groups in rural malaria endemic communities.

Impact of intensified control on the epidemiology and transmission of malaria in Papua New Guinea – the challenge of *Plasmodium vivax*

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Abstract:

A renewed emphasis on malaria control in Papua New Guinea has resulted in a significant overall reduction in the nationwide prevalence and incidence of malaria. However this reduction is not uniform, masking substantial heterogeneity of transmission at the local district and village level, with species-specific differences in impact in some areas. To investigate this, repeated community cross-sectional surveys and longitudinal child cohorts are being undertaken in East Sepik Province (ESP) and Madang Province (MP) combining sensitive molecular diagnosis of asexual and sexual-stage infections, with demographic and household GPS data. In ESP, where levels of transmission were historically very high, the reduction has been very pronounced for both *P. falciparum* and *P. vivax*, with infection prevalence declining from 72% in 2006 to 11% in 2013. In contrast, *P. falciparum* prevalence in Madang dropped from 39% to 18% to 9%, while *P. vivax* prevalence dropped from 32% to 13% but then rebounded to 15% in 2014. Importantly, 80-90% of these infections are asymptomatic and 50% sub-microscopic, posing a considerable challenge to existing methods of diagnosis and surveillance. In children 5-12 years of age, we observe an 11-14-fold reduction in the incidence risk of *P. falciparum* infection and illness between 2004 and 2013, compared to only a 3-4-fold reduction in the risk of *P. vivax* infection and illness. We observe that relapses cause 80% of these *P. vivax* blood-stage infections and contribute equally to the proportion of gametocyte positive children, confirming that the ability of *P. vivax* to relapse from hypnozoites and it's high transmissibility, render *P. vivax* significantly more resistant to control than *P. falciparum.* Mathematical models based on this data predict that mass screen and treat with blood-stage

treatment alone or with blood- plus liver-stage treatment would have only a transient effect on *P. vivax* transmission levels, whereas mass drug administration that includes liver-stage treatment would be an effective strategy for *P. vivax* elimination. Ongoing studies aim to strengthen surveillance at key sites, construct spatio-temporal maps of malaria incidence based on routine RDT/microscopy and highly sensitive PCR data and facilitate the implementation of targeted interventions.
Key words: malaria; control; elimination; transmission; heterogeneity; *Plasmodium vivax*; surveillance, Papua New Guinea

Comparison of Light Microscopy verses Rapid Diagnostic Testing in Diagnosis of Malaria with reducing prevalence of malaria in Papua New Guinea

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Abstract:

Background: Accurate diagnosis of malaria determines the course of treatment administered to patients and provides accurate data to the National Health Information System (NHIS). The national household survey from selected sentinel sites indicated a drop in parasite prevalence from 12.4% in 2012 to 1.8% between 2009 and 2014. Malaria diagnosis is confirmed in Papua New Guinea (PNG) by light microscopy and more recently rapid diagnostic tests (RDT). Malaria treatment protocol in PNG changed in 2012 to artemether-lumefantrine (AL) with primaquine (PQ) for *P vivax* and other species of malaria or without primaquine (PQ) for *P falciparum* to combat antimalarial drug resistance. AL is known to be safe and well tolerated. The safety of AL plus PQ (AL+PQ) combination has not been evaluated, especially in the context of glucose-6-phosphate dehydrogenase (G6PD) deficient populations such as in PNG where they are at an increased risk of anaemia. This study looked at the current practice in the diagnosis of malaria and treatment given in 6 sites in Papua New Guinea.

Methods: Adult patients aged 18 years or more had confirmed malaria diagnosis by microscopy or RDT or both with a known G6PD status were recruited. The primary aim of this study was to evaluate and compare the prevalence of species by microscopy and RDT, and the treatment administered. Prevalence of species was calculated, and chi-square test was used to compare the differences in prevalence of species between treatment groups and by G6PD status.

Results: A total of 393 patients were recruited. The overall study median age was 30.5 years (range 18-84 years). Malaria was diagnosed by microscopy in 47.6% of cases, rapid diagnostic test (RDT) in 45.3% of cases, and by both methods in 6.4% of cases. More than half (55.2%) of the patients were infected with *Pf*, followed by mixed infections with 26.5% and then *Pv* in 17.1%. RDT was the predominant method used for diagnosis for those infected with P*v* and mixed infections and received AL+PQ treatment (58.1%), whereas blood slide was the predominant method of diagnosis in those infected with P*f* (56.2%) and received AL treatment only ($p<0.001$). G6PD deficiency numbers were similar in both groups with 3.6% in the AL group and 5.2% in the AL+PQ group.

Conclusion: In this study more cases of *P vivax* and mixed infections were diagnosed by RDTs, therefore treated with AL+PQ. In areas where microscopy was performed for confirmation, majority of these cases turned out to be *P. falciparum*. Light microscopy is recommended for confirmation of mixed infections, but of acceptable quality, especially in reducing malaria prevalence in Papua New Guinea

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Larval Ecology and abundance of mosquito in the southwest region of cameroon Nguti

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Abstract:

The control of Malaria using drugs and insecticide-impregnated nets or the treatment of mosquito resting sites with long-lasting insecticides are increasingly failing, as drug-resistant parasites emerge and mosquito vectors develop resistance against insecticides. It is crucial to understand vector population dynamics in order to effectively control them. Sampling larval populations is one of the methods to estimate mosquito requirements for site selection for oviposition and survival.

Our survey took place from 10th of January to 10th May in the Nguti, located in the Southwest Region of Cameroon. Mosquito larvae were collected using standard dipping method twice a week in different mosquito breeding sites. Water physical parameters were recorded. We found *Anopheles gambiae* most abundant at the end of the rainy season in the surveyed area. There was no significant association detected between presence of *Anopheles* mosquito larvae and abiotic and landscape characteristics. However, we found that the density of early instar stages was increasing with increasing conductivity (p=0.01) and dissolved oxygen (p=0.02) and when habitats contained aquatic vegetation. Such habitats were associated with pastures. Late larval instars were positively associated with turbidity (p=0.003) and such habitats were more numerous in the settlement. This knowledge could be applied in the development of vector control strategies, aiming at the mosquito populations when they are mostly vulnerable.

Key words: Insecticide, Vectors, Ecology, Nguti, abiotic, larvae; density; breeding habitats; dipping; landscape; Ethiopia

Molecular epidemiology surveillance of malaria along China Myanmar borders

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Abstract:

China launched a national malaria elimination program to end local malaria transmission by 2015, excluding the Yunnan province bordering Myanmar, Vietnam and Laos. Myanmar, as the greatest malaria burden country, joined the other Asia Pacific countries at the 2015 East Asia Summit in endorsing a plan for malaria elimination in the region by 2030. To achieve this ambitious goal, innovative tools are needed for malaria surveillance, treatment and prevention. Malaria infection may be present in the human host with or without symptoms of illness, and both symptomatic and asymptomatic infections must be eradicated for successful malaria elimination. Moreover, artemisinin resistance in *Plasmodium falciparum* has emerged in Southeast Asia and poses a threat to malaria control and elimination. Mutations in a *P. falciparum* gene encoding a kelch protein on chromosome 13 have been associated with delayed parasite clearance following artemisinin treatment in Southeast Asia. This study was designed to designed to evaluate clinical outcomes after 7-day artesunate monotherapy or standard 3-day treatment with dihydroartemisinin-piperaquine for uncomplicated *P. falciparum* malaria at three sites in the Yunnan Province along the China-Myanmar border. Sequencing of the propeller domains of the K13 gene was performed to identify mutations and test their association with delayed parasite clearance. Meanwhile, using multiplexed real-time PCR, conventional nested PCR, and RDT to detect the subclinical *P. facliparum* and *P. vivax* infection along the China Myanmar borders. From 5-year therapeutic efficacy study, *P. falciparum* infections along China Myanmar borders displayed markedly delayed clearance following artemisinin treatment**.** Parasite clearance half-lives were prolonged after artemisinin treatment, with 44% of infections having half-lives >5 hours. Fourteen mutations in K13 were observed, with an overall prevalence of 47.7%. A single mutation, F446I was the predominant K13 mutation and was associated with delayed parasite

clearance. A prospective cross-sectional field study in two sites bordering Kachin and Shan state of Myanmar to estimate the prevalence of malaria. The results showed that microscopy or RDT or nested PCR is as good as multiplexed qPCR for symptomatic infections likely due to high parasite density, but for asymptomatic infections, RDT or nested PCR missed 44% and 48% infections as detected by qPCR. High sensitive of qPCR or ultrasensitive qPCR may be essential to measure true prevalence of asymptomatic malaria reservoir to inform elimination strategies in the regions. Molecular surveillance, combined with genomic epidemiology and geospatial mapping and modelling of malaria risk will provide essential knowledge, tools and evidence-based strategies not only for China Myanmar borders but the regional national malaria control programs to ultimately eliminate malaria in Southeast Asia.
Key words: malaria, artemisinin resistance, kelch 13, asymptomatic malaria, China Myanmar borders

Assessment of Common Glucose-6-Phosphate Dehydrogenase (G6PD) Deficiency Allelic Types in Ethiopia

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Abstract:

Building on the declining trend of malaria in Ethiopia, the Federal Ministry of Health aims to eliminate malaria from selected low transmission settings by 2020. As *Plasmodium falciparum* and *P.vivax* are co-endemic in Ethiopia, the use of primaquine is indicated for both transmission interruption and radical cure, respectively. However, the knowledge gap in the prevalence of G6PD deficiency and its associated distribution has been a limiting factor on the use of primaquine.

About 12,000 dried blood spot (DBS) samples were collected in 2011 as part of the national Malaria Indicator Survey, a multi-stage nationally representative survey in all malaria endemic areas of Ethiopia. A randomly selected subset of the DBS was genotyped by polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) technique. Considering the geographical position and ethnic mix of the country, three common G6PD variants: G6PD*A (A376G), G6PD*A- (G202A) and Mediterranean (C563T) were investigated.

Of the 2000 samples selected, 1585(79.2%) were available for genotyping, among which 54% were from females. G6PD*A (A376G, 8.08% was the only genotype detected with no samples positive for A- or Mediterranean variants. The result noted regional variations with the highest observed in Southern Nation and Nationalities Peoples'Region 13.08% and with none in Harari. The prevalence in other regional states were 6.98% in Amhara, 11.20% in Oromia, 13.72% in Tigray, 6.10% in Afar and Somali combined, and 5.50% in Gambella and Benishangul-Gumuz combined. Of this A mutation variant, 31% were hemizygous males, 62.1% and 6.8% were heterozygous and homozygous females respectively.

The results support the limited historical evidence of low G6PD deficiency prevalence in Ethiopia. The A376G (A) mutation observed is a mild deficiency causing around 90% of the normal enzymatic activity

with little clinical significance. The more severe G6PD deficiency allelic types, G202A (A-) and C563T (Mediterranean), common in Africa were not observed, supporting the safe use of primaquine especially for transmission interruption of falciparum malaria in Ethiopia.

University of Pretoria Centre for Sustainable Malaria Control: Research towards malaria elimination

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Abstract:

The University of Pretoria Centre for Sustainable Malaria Control (UP CSMC) is a fully integrated, multidisciplinary, interfaculty initiative. The aim of the Centre is to coordinate and promote collaborative research on safer and sustainable malaria control and management and generate new knowledge and support new activities pertaining to safe malaria control in Africa through fundamental and applied research, supported by research collaboration with regional, national and international partners. In 2014 the UP CSMC has become an MRC Collaborating Centre for Malaria Research. The research activities of the UP CSMC area are aligned with the National Department of Health's goal to eliminate malaria in South Africa by the year 2018.

The classic definition of sustainability implies the ability to maintain an effort at a certain level or rate. Malaria however, is the result of a highly complex interplay between three biological systems each with its own complex lifecycle, environment, habits and pathogenesis profiles. Furthermore, the transmission of malaria is compounded by the current global environment e.g. with travellers' malaria repeatedly reintroducing the disease and global climatic changes. Sustainable malaria control should, therefore, be seen as long-term effort(s) focused on decreasing malaria-associated fatalities through integrated, creative transdisciplinary approaches that will ultimately contribute to malaria elimination and eradication. In this context, trans-disciplinarity requires the combination of basic biomedical sciences and public health efforts and the inclusion of the management of malaria in education and policy making.

The Centre's vision is to make a substantial contribution towards the creation of a malaria-free Africa by:

- Employing sustainable and environmentally safe malaria control technologies;
- Establishing integrated vector management strategies;
- Ensuring effective malaria case management; and
- Promoting health education in affected populations

In support of this vision, the UP CSMC has the following goals:

- To follow an integrated, trans-disciplinary approach in generating new knowledge pertaining to safe malaria control in Africa through fundamental and applied research;
- To support and promote research collaboration within the UP and with relevant partners regionally, nationally and internationally; and
- To build a critical mass of people performing cutting edge malaria research through the support of academic excellence and development of students.

Plasmodium malariae, P. ovale curtisi and *P. ovale wallikeri*: can these three species be included in the malaria elimination agenda?

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Abstract:

Many countries across the tropical world have made significant advances towards malaria elimination, with a particular emphasis on reduction in transmission of *Plasmodium falciparum*. Many countries have also progressed in the control of vivax malaria. Progress towards elimination of the human malaria parasites *P. malariae*, *P. ovale curtisi* and *P. ovale wallikeri* has not yet been clearly demonstrated. AN overview of the biological adaptations of these species which permit persistent, asymptomatic parasitism among human communities, will be discussed. New insights from recent genome sequence data from each of these three species will be presented and discussed in terms of strategies for elimination of all human malaria.

Key words: malaria; *Plasmodium malariae*; *P. ovale* spp.; disease elimination;

Genetic diversity and population structure of *Plasmodium falciparum* in Lake Victoria islands, a region of intense transmission

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Abstract:

Introduction: Malaria arising from *Plasmodium falciparum* infection continues to be a major public health problem globally with over 500,000 deaths reported annually, predominantly in sub-Saharan Africa. Efforts to controls this disease have been futile due to diverse *P. falciparum* population structures which are apparently correlated to local endemicity, transmission rates, geographical isolation levels and migration patterns of inhabitants. Over the last decade there has been increased commitment to eliminate malaria from selected areas in which it is endemic. Islands are targeted in determining feasibility of malaria elimination in different transmission settings as they are assumed to be isolated with negligible possibility of reintroduction of malaria parasites by migration. Vanuatu, an endemic archipelago in the South-West Pacific region has been studied to determine the feasibility of malaria elimination in low transmission settings as well as how human movement within and between the islands affects intervention plans. However, despite extensive malaria feasibility studies on islands with low malaria transmission, not much has been done on islands lying in high transmission regions. Past failures of malaria elimination experienced in malaria endemic islands such as Zanzibar off the coast of Tanzania and Comoros archipelago off the Eastern coast of Africa raised question on the extent of human, and vector migratory trends and parasite population structure on these intense transmission islands. We therefore aimed to assess whether it is feasible to eliminate malaria in highly endemic areas. Located in a high transmission region in western Kenya and where *P. falciparum* is the predominant species, Lake Victoria islands are ideal for such investigations. Since the efficacy of elimination program on islands may depend on influx of new parasites, we performed parasite population genetic analysis to help identify routes of transmission and gene flow patterns. Such information will determine if malaria interventions can be targeted and confined to those particular islands or if there should be overall coverage to reduce reintroduction of malaria parasites.

Materials and methods: *Plasmodium falciparum* malaria positive blood isolates were collected from

inhabitants of four Lake Victoria islands namely; Mfangano, Ngodhe, Kibuogi and Takawiri and a shoreline region (Ungoye) in western Kenya during a baseline survey conducted in January and February, 2012. Analysis of *P. falciparum* genetic diversity, existence of single or mixed infections and patterns of population structure was conducted using eight putatively neutral microsatellite loci distributed on different chromosomes of the parasite genome.

Results and discussion: The parasites obtained from the studied regions reported high levels of genetic diversity (Mean H_e=0.84) and this was comparatively similar to those previously described in other countries with high malaria transmission intensities. This genetic variability though different by loci and by studied sites, did not meet the threshold for statistic significance. 80% of the analyzed *P. falciparum* isolates were multiclonal infections with more than one detected parasite genotype. An overall mean of 2.31 genotypes per individual was observed. The mean observed F_{ST} overall between and within isolates from the different geographic sites was 0.044 indicating that approximately 5% of the overall allelic variation is due to differences observed between the five populations. F_{ST} indices measuring inter-population variance in allele frequencies ranged from 0.014 to 0.081, and were significantly different from 0 for all population pairs ($p<0.05$). The genetic differentiation and geographical distances between all pairs of parasite population measured using the Mantel test, showed no significant evidence for isolation by distance. For instance, the highest population structure (F_{ST}=0.081) was observed between mainland (Ungoye) and the island population (Kibuogi) despite their geographic proximity (9.6 km apart). We argue based on these observations, that there might be existence of gene flow barriers between these parasite populations. Conversely, Mfangano island, 15.8 km from Ungoye showed relatively low genetic differentiation (F_{ST}=0.023) indicative of considerable gene flow between the two sites. Based on these results, we concluded that parasite population structure in this Lake region is shaped by human migration patterns which translate into extensive parasite gene flow between the sites.

Conclusion: Our results demonstrate that the population structure of *P. falciparum* in this lake region is fairly diverse and fall within the expectation of a high malaria transmission zone. The low levels of genetic differentiation observed between the study sites is likely to be a consequence of immense human traffic into and out of the islands as part of routine socio-economic activities. Since islands are being considered as models of study for the feasibility of malaria elimination in endemic regions, studies of this nature are highly pertinent. The findings obtained in this study suggest that elimination strategies might need to be carried out indiscriminately on the islands.

Application of mosquito repellent coils and associated self-reported health issues in Ghana

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Abstract:

Background: The use of mosquito coils has gained widespread patronage in malaria endemic countries, even though it is not a recommended preventive measure for avoiding the mosquito. Mosquito coils contain insecticides, which are expected to vaporise slowly once the coil is lit, to provide a protection against the mosquito. The mosquito coil base material contains a variety of compounds capable of burning slowly to gradually release the insecticide. The mosquito coil smoke, however, is potentially a source of indoor air pollution with implications for acute respiratory infections (ARI) and other illnesses. The present study investigated the application of mosquito coils and associated self-reported health issues in Ghana.

Methods: A cross-sectional study was undertaken in which questionnaires were randomly administered to 480 households across four districts in Ghana. Respondents who exclusively applied mosquito coils were grouped as test cohort, while those who did not apply any mosquito repellency method constituted a control cohort.

Results: The test group that applied mosquito coil reported malaria incidence rate of 86.3%. The control group that did not apply any mosquito repellency method rather reported a reduced incidence rate of malaria at 72.4%. Chi-square analysis suggested that the observed difference was statistically significant ($x^2 = 4.25$; $p = 0.04$). Respondents who reported symptoms of cough from mosquito coil application (52.6% incidence rate) were marginally greater than their counterparts who did not apply the coil (46.1% incidence rate). It was also found out that respondents with short breath, which was used as a proxy for ARI, were more likely to have applied mosquito coil.

Conclusions: The application of mosquito coil did not necessarily reduce the incidence rate of malaria in the study communities. It however presented a potential respiratory risk factor, which should be further investigated by critically examining exposure to particulate matter emissions from burning coils.

Key words: Malaria, mosquito coil, mosquito net, insecticide residual spray, acute respiratory infection, indoor air pollution.

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Epidemiological characteristics of imported malaria in Sichuan Province in 2015

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Abstract:

Objective: To analyze the epidemiological characteristics of imported malaria in Sichuan in 2015 so as to provide the scientific basis for developing control strategies.

Methods: The reported malaria cases from the Internet reporting system and epidemiological data of malaria were collected and analyzed statistically in Sichuan Province.

Results: There were 290 malaria cases in Sichuan Province in 2015. In detail,54.48% (158/290) were Falciparum malaria case, 36.90%(107/290)were Vivax malaria case, 4.83%(14/290) were Ovale malaria cases,0.34% (1/290) were Quartan malaria cases , and 3.45% (10/290) were mixed infection of Vivax malaria and Falciparum malaria . Among these five cases died. 290 malaria cases were overseas imported cases, including 271 patients returned from Africa, accounting for 93.45% of the total cases. The country with the most cases was Ethiopia in Africa (83 cases) ,the second was Angola in Africa (49 cases) .The cases were reported every month. 139 cases were reported in December ,August, June and July, accounting for 47.93% of the total malaria cases. The cases distributed mainly in Guangan, Chengdu, Nanchong, Mianyang, Deyang, Luzhou and Suining, where there were 243 cases, reaching 83.79% of the cases of the whole province. The misdiagnosis rate of first visit to medical units was 43.54% .

Conclusion: The Malaria cases reported in Sichuan Province in 2015 were imported from overseas, the infection species diversity, mainly for Plasmodium falciparum and Plasmodium vivax , mainly form africa. Due to the lack of diagnostic ability of malaria in medical institutions, the rate of misdiagnosis is higher.

Key words: malaria；epidemic situation；imported cases；Sichuan

Malaria control and the road to Elimination in Papua New Guinea

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Abstract:

Malaria is still one of the most important public health concerns in Papua New Guinea (PNG), and is one of the leading cause of health facility attendance and deaths in children under the age of five years.

Over the last decade PNG has developed World Class Malaria Control Program which views its success based on strong public private partnerships (PPP) with its programs partners and has been successful in recent years in controlling malaria in the PNG.

There has been a significant reduction in malaria prevalence from 18.2 to 1.8 % in the period 2012-2014. Similarly with incidence rate from 205 cases per 1,000 per year to 48 cases from 2010-2014.

The Malaria prevalence reduction is well over 90% surpassing the MDG target of 75% by 2015. PNG has successfully achieved a Millennium Development Goal (MDG) of reducing malaria prevalence by 75% before the end of 2015.

Despite this success the program is NOT currently in a financial position to maintain the gains achieved in controlling malaria.

The result of under resourcing will be the likely rapid resurgence of malaria and increase outbreaks of malaria and a high risk of anti-malarial drug resistance-making it more difficult to address in the future.

While the national statistics is very encouraging in terms of the achievement made, the epidemiological situation is not the same throughout the country so the disease burden varies from place to place. This will require alternate targeted strategies to further reduce the disease burden.

PNG is now a member of the regional malaria elimination network known as Asia Pacific Malaria Elimination Network (APMEN) and Asia Pacific Leaders Malaria Alliance (APLMA) in which the Australian and Vietnam Prime ministers are co chairs to over see the elimination of malaria in the region by 2030. To be a part of the elimination networks PNG has to reconsider the resourcing of the program and reconsidering the agenda of malaria elimination from the highest level possible.

Public-Private-Partnerships (PPP) has been a very critical component of the success of the malaria control program so far. The control of malaria needs a sector wide approach as everybody stands to benefit. Government alone cannot control malaria because of the complexities of the disease and its distribution.

Key words: National malaria control program; Malaria elimination; Papua New Guinea; Public-Private-Partnerships; Millennium Development Goals (MDGs); Asia Pacific Malaria Elimination Network (APMEN); Asia Pacific Leaders Malaria Alliance (APLMA)

Use of Short Message Services technology (SMS) for training, control and elimination of Malaria in Uganda

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Abstract:

Background: In Uganda, The population coverage for mobile telephone is close to 100%, while geographical coverage is about 65% according to the Uganda Communication Commission. The Stop Malaria Project, assessed the effectiveness of using mobile phone SMS to measure retention of knowledge amongst 95 laboratory personnel from rural health centers.

Research Methodology: The personnel attended a three-day training on laboratory diagnosis of malaria using microscopy and rapid diagnostic tests (RDT). Six weeks after the training, all 95 trainees began receiving follow-up quiz questions via SMS. The trainees were asked to reply to a toll free SMS platform which instantly acknowledged receipt of response and provided feedback on whether the answer was correct or not. The trainees were asked a total of 25 questions – 21 multiple choice and four open ednded response – over the course of 13 weeks. The questions covered the topics of phlebotomy; preparing, examining, and reporting blood smears; differentiating malaria species; and performing RDTs. A toll free phone line was also used to provide reminders and receive technical queries in relation to the SMS.

Results: 71% of the trainees responded to the SMS quiz questions. Multiple choice questions had an average response rate of 74% while open ended questions were at 51%. Of the trainees that responded, 75% submitted the correct response.

Conclusion: There was high percentage of responses in general, and specifically the high percentage of correct responses, shows that SMS is effective as a post-training approach to measure knowledge retention. The results also emphasized that multiple choice questions are more appropriate for SMS post-training follow-up compared to open ended questions. However, a number of there challenges that hindered responses included busy work schedules, poor network coverage, and lack of battery power.

A new tool in the development toolbox – trilateral cooperation and the "Australia-China-Papua New Guinea Pilot Cooperation on Malaria Control Project"

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Abstract:

International aid architecture is changing, and with it, the tools on hand to effectively achieve sustainable development outcomes on a global level.

Traditional terms such us "developed vs developing" or "donor vs recipient" are losing relevance as development actors increasingly adopt south-south and trilateral cooperation models, thereby mobilizing diverse development resources to tackle common goals.

As first recognized by the international development community on a global scale through the Busan Partnership for Effective Development Co-operation (2011), the benefits of trilateral (or triangular) cooperation go beyond financial scale-up and alignment. This model combines the diverse yet complementary expertise, technologies and resources of traditional and emerging donors, together with their host partners, to effectively create local solutions to shared challenges.

This paper identifies the key advantages (and associated challenges) which come with adopting a trilateral cooperation approach, with reference to the recently established Australia-China-PNG Pilot Cooperation on Malaria Control Project. The Project comes at a critical time for PNG's National Malaria Control Program as it moves to consolidate recent gains and enter the pre-elimination phase of malaria control. The Chinese Government has accumulated significant experience and resources in reducing malaria, complementing the long-standing support of the Australian Government to PNG's national malaria interventions. The Project leverages financial and in-kind resources from the three governments to improve malaria diagnosis and operational research in PNG through effective cooperation.

Through adopting this triangular model, the Project becomes a key tool capable of achieving successes in the following areas:

- Technical: China's National Institute of Parasitic Diseases, in collaboration with selected Australian institutions, will support PNG's National Department of Health; Central Public Health Laboratory and provincial laboratory network; and Institute of Medical Research to improve the quality of malaria diagnosis and research nationally, through knowledge exchange and peer learning;
- Financial: in addition to the financial contributions mobilized through this Project, progressive results achieved through the Project demonstrate the effectiveness of this model, leading to opportunities for scaled-up cooperation in other sectors;
- Coordination: promotes synergies and alignment of development contributions from different actors;

- Political/economic: used as an instrument of foreign policy, fosters improved understanding and relationships between actors which spills over into other areas such as foreign affairs and trade; and
- Social: fosters people-to-people links through promoting collaboration, cultural exchange, and friendships between government ministers, officials, technical experts, and new graduates.

It is expected that lessons generated through the Australia-China-PNG Pilot Cooperation Project (in addition to other trilateral cooperation projects being delivered around the world) will build global confidence in deploying this relatively new model in international aid as an alternative tool to tackle our world's most pressing development challenges.

Key words: Trilateral Cooperation; Triangular cooperation; Aid effectiveness; Malaria control; Malaria diagnosis; Malaria research; Government of Papua New Guinea; Government of People's Republic of China; Government of Australia

Whole killed, blood-stage vaccine: one vaccine against all stages

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Abstract:

Although great efforts have been made in the past fifty years, no effective subunit vaccine is licensed, and the whole parasite vaccine is therefore retained attention in the recently years. The attenuated sporozoite is the most efficient vaccine to prevent the infection of malaria parasite, but the limitation of the source of the sterile sporozoites greatly hampers its application. In contrast, the attenuated blood-stage vaccine could be easily made as the blood stage of malaria parasite could be cultured. We found that the whole killed, blood-stage vaccinated mice could effectively resist to the blood-stage challenge, which is dependent on both malaria parasite-specific antibody and CD4+ T cells responses. Of note, the C5a generated during immunization is essential for the induction of malaria parasite-specific CD4+ T cells response through acting on C5aR of DC. Interestingly, the whole killed blood-stage vaccinated mice could also resist the challenge of sporozoite, and malaria-specific CD8+ T cells are the predominant protective effectors. Additionally, the whole killed, blood stage vaccine could greatly suppress the development of different strains of malaria parasites in mosquito, and the protection is contributed to the malaria parasite-specific antibodies and MCP-1. Therefore, we presented a promising strategy that rational designation of an effective whole killed blood-stage vaccine could not only prevent the malaria infection, but also block the transmission of malaria parasite.

Preparedness of Malaria elimination: Nation-wide assessment of ownership and utilization of bed-nets at household level in Myanmar

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Abstract:

Malaria elimination is the urgent global issue in this recent era. Similarly, Myanmar targets malaria elimination by 2030. The burden of Malaria in Myanmar is the highest in Greater Mekong Sub-region (GMS) although the malaria morbidity and mortality trend in Myanmar is going down in these years. The use of insecticide-treated bed-nets/long-lasting insecticidal nets (ITN/LLINs) is a vital intervention for ensuring reduction of malaria transmission (including resistant strains) and eliminating malaria. This study aims to assess current situation of the ownership and utilization of bed-nets in relation to areas of artemisinin resistance in Myanmar. This study was nation-wide cross sectional descriptive study conducted in 2014. A total of 6318 households from all states and regions were involved in this assessment. Multi-stage sampling procedure was used for selecting townships, villages and households to ensure the random selection. Face to face interview using pretested semi-structured questionnaire were conducted with interviewers trained by Department of Medical Research. Out of the survey households, 97.2 % of the households had at least 1 bed net. About half of the households had at least 1 ITN/LLINs. The mean of individual ownership of any bed-nets was 0.66 and 0.34 for individual ownership of ITN/LLINs. The individual ownership of ITN/LLINs in Myanmar Artemisinin Resistance Containment (MARC) area (0.47) is significantly higher than Non Myanmar Artemisinin Resistance Containment (Non MARC) area (0.29). Regarding utilization of bed nets, 61.1% of any type of nets, 19.1% of LLIN and 31.4% of ITN were used in the households. Nearly 40% of household members were sleeping under ITN/LLINs. The total number of individuals from MARC area more slept under ITN/LLINs than Non MARC area (P value <0.001). About 43% of pregnant women slept under ITN/LLINs. The major sources of LLIN were from Government (62.9%) and Non-Governmental Organization (NGO) (31.2%). This study highlights that the current ownership of ITN/LLINs is quite low and utilization of bed-nets at household is also low in Myanmar. Targeting malaria elimination by 2030 in Myanmar, the nation-wide distribution of ITN/LLINs

together with health education to increase utilization should be promoted by National Malaria Control Program collaborating together with other organizations.
Key words: Malaria, ITN/LLINs, MARC area, bed nets ownership, utilization

Parallel 5: Helminth Control with BCC demonstration

Seroprevalence, environmental and behavioral risk factors of *Toxocara canis* infection among women in Swaziland, Southern Africa

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Abstract:

Human toxocariasis is one of neglected zoonotic diseases worldwide, predominantly caused by *Toxocara canis* (*T. canis*) infection. Kingdom of Swaziland is located between South Africa and Mozambique. Because of poor hygiene and sanitation, the seroprevalence of *T. canis* infection among schoolchildren was reportedly high, reaching 88.6%. According to murine studies, larvae entrapped in various tissues in the body were capable of causing chronic inflammation as well as transmitting into the fetus via placenta or mammary route. We intended to investigate the status of *T. canis* infection among adult women in Swaziland by employing western blot analysis based on excretory-secretory antigen derived from *T. canis* larvae. The overall seroprevalence was quite high as 75.7% (399/527). The logistic regression analysis showed that those participants who lived in suburban areas seemed to be more susceptible to *T. canis* infection as compared to those who lived in urban areas (ORs = 4.17, 95% CIs = 2.27 – 7.69, $p < 0.0001$). The age group of less than 30 years old, who are the major childbearing age population in Swaziland, had higher opportunity in acquisition of *T. canis* infection (80.4% ; 148/184), than those in the age group of 31-50 years (ORs= 1.92, 95% CIs =1.01-3.70, $p = 0.047$). Although there was no significant association between *T. canis* infection and history of abortion among adult women (ORs=1.22, 95% CIs =0.66-2.22, $p = 0.534$), it remained serious concerns to further investigate on whether congenital toxocaral transmission may occur to pregnant women in Swaziland.

Key words: *T. canis*; TcES; Seroprevalence; Risk Factors; Women; Swaziland

Parallel 6: Advance in surveillance response system of tropical diseases - 1

Reaching the surveillance-response stage of schistosomiasis control in the People's Republic of China: a modelling approach

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Abstract:

With the goal set to eliminate schistosomiasis nationwide by 2020, China has initiated the surveillance-response stage to identify remaining sources of infection and potential pockets from where the disease could re-emerge. Shifting the focus from classical monitoring and evaluation to rapid detection and immediate response, this approach requires modelling to bridge the surveillance and response components. We review here the studies relevant to schistosomiasis modelling in a Chinese surveillance-response system with the expectation to achieve a practically useful understanding of the current situation and potential future study directions. We also present useful experience that could tentatively be applied in other endemic regions in the world. Modelling is discussed at length as it plays an essential role, both in the intermediate snail host and in the definitive, mammal hosts. Research gaps with respect to snail infection, animal hosts and sectoral research cooperation are identified and examined against a background of the prevailing ecosystem and socio-economic changes with a focus on co-existing challenges and opportunities in a declining budget environment.

Key words: schistosomiasis japonica; surveillance-response; modelling; People's Republic of China;

New foci for Cutaneous Leishmaniasis - Ankesha District, Amhara region, Ethiopia

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Abstract:

Cutaneous leishmaniasis (CL) is a neglected tropical disease affecting the poorest of the poor in over 80 countries. The global incidence is estimated to range from 0.7 to 1.2 million cases per year. With estimated 29 million people at risk and 20,000 to 30, 000 new cases per year Ethiopia is one of the ten high burden countries. Moreover, CL is a growing public health concern appearing in areas previously not known to be endemic and reported up to 5.6% CL/HIV co-infection. From studies so far in more than 90% of the cases *Leishmania aethiopica* (*L. aethiopica*) is incriminated as the causative species in Ethiopia. A preliminary rapid assessment survey was done from November 2013 to January 2014. Thirty seven cases and 74 apparently healthy individuals were interviewed. We used WHO case definition to identify cases. Skin slit lesion sample was taken from 25 cases. Smear microscopy and culture were confirming clinical diagnosis. Polymerase chain reaction based restriction fragment length polymorphism was done for species identification. Structured questionnaire was used to collect information about knowledge and perception of the participant. Exploratory descriptive analysis was made to get in site about CL in the area. The median age of the study participant was 16 years old with a range of 3 to 66. Males and 10-19 years age group were most affected. Two clinical form of CL were observed; 33 (89%) localized cutaneous leishmaniasis and 4 (11%) diffused cutaneous leishmaniasis. All of CL lesions were observed on the exposed parts of the body such as the face and upper and lower limbs. Number of lesion ranged from 1 to multiple (3 and above). A single lesion was found in 10(27%) of the cases, greater than half 25 (67.5%) of the cases had 2-3 lesions and only 2 (5.5%) cases showed multiple (more than 3) lesion. 16 samples were positive by smear and culture. The community did not know the cause, transmission and prevention mechanism of CL and there was no local name for the disease. We confirmed that the cause of cutaneous lesions among the residents of Sositu Gimjabet kebele, Ankesha district is CL. The average duration of lesion in the 37 participants was three month and range with one to six month showing the probability that CL appeared in this kebele recently. It seems that *L. aethiopica* is the major causative agent for all. The 16 samples were typed as *L. aethiopica*. None of the interviewees had knowledge about the cause of CL rather they link it with sins in most of the cases. The presence of CL in Ankesha was not known before thus underlining the need for further survey to certain the claim of new outbreak, and identify associated risk factors to designed efficient and effective control.

Key words: Cutaneous leishmaniasis, *Leishmania aethiopica*, Ankesha, Ethiopia

Arboviral diseases in the Arabian Peninsula: epidemiology, transmission and control

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Abstract:

The Arabian Peninsula has peculiar position bordering the Oriental, Afrotropical and Palaearctic zoogeographic zones with diverse ecology and fauna. In Saudi Arabia there eight mosquito dominant vector species, the most important of which are *Aedes aegypti* and *Culex pipiens* complex, vectors of arboviruses. In the last few decades, the south-western region of the Arabian Peninsula, especially Saudi Arabia and Yemen have suffered from many outbreaks of arboviral diseases, the most important of them are dengue and Rift Valley fevers. Understanding the ecology and population genetics of the vector mosquitoes and the viruses is essential for understanding the disease transmission patterns and put effective and sustainable containment and disease control plans. We summarize here the history and current status of arboviral diseases in the region with emphasis on the best practices for control under local and regional biogeographic conditions.

The Necessity of Mobile Phone Technologies for Health Surveillance and Interventions in Benin

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Abstract:

With respect to the expansion and increased use of mobile phones for various health interventions around the world including several African countries and the persuasive need of such technology to improve health surveillance in developing countries, mobile phones seem to have not yet been integrated to health surveillance systems in Benin. A qualitative cross-sectional study was conducted to investigate the need of mobile phone technologies for health surveillance and interventions in Benin. From 1st to 15th March 2016, this study enrolled a total of 130 individuals including 25 Medical Doctors, 33 Veterinarians and 72 respondents from the general population recruited in two urban areas, Cotonou and Abomey-Calavi Cities and Kpomassè Municipal (a rural area). Structured pre-tested questionnaires were designed in French and administered to human and animal health professionals as well as the general population to probe information on the need of mobile phone in health surveillance and interventions in Benin. Findings show that all respondents (100%) possess cell phones and majority already have the habit of using them for medical purposes. Most of respondents (68% of medical Drs, 72.2% from general population and 84.8% of Vets) acknowledged that the current classic surveillance systems in the country are ineffective and not real time. Nearly all of them confirmed that mobile phones can improve health interventions and surveillance in the country (88% of medical Drs, 91.7% from general population and 97% of Vets). Furthermore, all respondents (100%) adhere to a nascent project of mobile phone-based health surveillance and confirmed that there is no existing similar approach in the country yet. However, the most preferred methods by all respondents for effective implementation of such platform are phone calls followed by SMS and smart phone digital forms. This study revealed urgent needs of mobile phone technologies for health Surveillance and interventions in Benin for timely and efficient health surveillance leading to tropical diseases elimination. The current findings also call for projects towards the development of mobile phone-based surveillance network in Benin.

Key words: mobile phone technologies, health surveillance, Surveillance System, Benin.

Promotion and Application of Surveillance Response Systems in National Efforts to Control and Eliminate Tropical Diseases through Cooperation.

Sarah Clare Iloke Masika

A. Statement of the Problem

Malaria has been known to cause rampant early deaths in expectant mothers and in children under the age of 5 years in developing countries as well as in the whole world for the last decade. This is because malaria parasites have shown some cases of resistance to the current and effective first line of drug-Artemisinin-in combination with Lumefantrine. Therefore, no vaccine or an alternative stronger form of malaria drug with a better mode of action that can be used to eliminate malaria parasites.

B. Literature Survey on Malaria Cases and Artemisinin Resistance.

Malaria is a mosquito-borne disease caused by a protozoan parasite. People with malaria often experience fever, chills and flu-like illness; if left untreated, they may develop severe complications and die. I n 2013, an estimated 198 million cases of malaria occurred worldwide and approximately 500,000 people died, mostly children from Africa Region. About 1,500 cases of malaria are diagnosed in USA each year. The vast majority of these cases are in travellers and immigrants returning from their countries where malaria transmission occurs, many from Sub-Saharan Africa and South Asia, where the climate is warm and wet, favourable conditions for breeding of the mosquito vectors.

Plasmodium falciparum is the deadliest form of the malaria protozoan parasite that is responsible for the vast majority of the mortality and morbidity associated with malarial infection. It is this parasite that has shown widespread resistance to Artemisinin Combination Therapies-a vital and current front line treatment against this parasite.

In February 2015, Artemisinin resistance has been confirmed in 5 countries of the Greater Mekong Sub Region: Cambodia, the Lao People's Democratic Republic, Myanmar, Thailand and Vietnam. Along the Cambodia-Thailand Border, the parasite has become resistant to almost all available anti-malarial medicines. This shows that there is a real risk of multi-drug resistance to emerge soon to all other parts of the sub-region too.

This spread or independent emergence of artemisinin resistance in other parts of the world, could pose a major health security risk as no alternative anti-malarial medicine is available at the present with the same level of efficacy and tolerability as the Artemisinin Combination Therapies. Therefore, there is increasing pressure to sustain the efficacy of existing treatments, develop alternative treatments including vaccines, as well as putting in place preventive measures.

C. Working Hypothesis

My focal point for research in relation to national control and elimination programme on malaria is to derive an alternative drug or a vaccine based on the anti-malarial properties of these two herbs: *Tithonia rotundifolia* and *Leonotis nepetifolia* which have been known to have anti-malarial properties that can

exterminate malaria properties.

D. Literature Review on *Tithonia Rotundifolia* and *Leonotis nepetifolia*

Tithonia rotundifolia, commonly known as Mexican Sunflower as common name, is from plant family Asteraceae and has been used as an indigenous herbal medicine. It is a wild annual flowering plant native to Mexico and Central America. Native communities have used extracts, concoctions or ashes from various parts of the plant as a remedy for malaria and diarrhoea. In Cancus, the seeds have been used as a substitute for quinine in the treatment of malaria. It has also been known to have other medicinal values like remedies for common colds and coughs, as a diuretic and expectorant, as an anti-microbial agent and in cauterisation of wounds and infections. These properties are due to active isolated phytochemical compounds which have been scientifically validated. They are tannins, alkaloids, saponins, flavonoids, steroids and terpenoinds. Mostly the seeds and the leaves were used in the preparation of the medicines.
Leonotis nepetifolia, commonly known as Christmas Candle Stick as common name, is from plant family Lamiaceae, a wild flowering plant that is native mainly to less arid areas of Africa, India and the Carribean. It has also been used as an indigenous herbal medicine by native communities. Tea made from its leaves has been known to alleviate fever and common colds as well as combating malaria. It has also been known to have other medicinal values like treatment of burns, ease of arthritis pain, ease of asthma, diarrhoea as well as an anti-bacterial agent. These properties are due to polyphenols and glycosides, naturally occurring alkaloids like stachydrene and leonurine, and flavonoids like quercetin, apigenin, rupin and hypersoside that have been scientifically isolated and validated. Mostly the leaves were used in preparation of the medicines.

E. Research Design-Synopsis of the Methodology

This study is about eliminating malaria parasites by finding an alternative stronger drug with a better mode of action or a potential vaccine since malaria parasites have currently shown resistance to the existing first line of treatment-Artemisinin Combination Therapies. This study can be carried out in Kenya or even in foreign countries so long as there are resources. The type of data expected to be obtained is numerical data (quantitative) since it will involve counting the number of parasites per ml of blood in a microscopic field of view as well as qualitative data, i.e. record of symptoms and behavioural changes. These types of data can be obtained as results from experimentation outlined below. The study can take as much time so long as valid and analysable results can be obtained. The data can be analysed by use of graphs so long as adequate data is available.

Therefore, in order to determine the efficacy of the phytochemicals present in the plants, the following is the conceptual procedural structure that is needed to be done.

a) In-vitro cultivation of Plasmodium falciparum at erythrocyte stage in petri dishes using a basic tissue culture media with serum and erythrocytes added to it.

b) Sampling of the leaves-the dried bulk samples of leaves from each of the plant is crushed using pestle and mortar, sieved through a mesh to obtain a fine powder. The powdered samples are then mixed together for each of the plant leaves, quartered to obtain a representative sample.

c) A constant weight of powdered leaves from each plant is measured and put into a beaker and mixed with constant amount of distilled water. The mixture for each plant powdered leaves is then stirred and allowed to soak for 24 hours.

d) The extract of each is filtered thrice through a plug of absorbent cotton wool in a glass funnel. The aqueous extract is then filtered through 11cm Rund filter paper MN713. The solutions are then concentrated by gentle evaporation on a heating mantle and poured into a 100ml beaker each.

e) Constant volume of each extract are mixed together to obtain a concoction of the two plant extracts, i.e. 10ml of *Tithonia rotundifolia* extract is mixed with 10ml of *Leonotis nepetifolia* extract.

f) 30 mice, which are experimental units, will each be injected with constant amount of in-vitro cultivated malaria parasites into their vascular system.

g) The 2 extracts and the concoction will be the treatments which will be subjected to different dilutions to get their different concentrations. 10 mice will be subjected to oral administration of one type of extract but of different concentrations. Another 10 mice will be subjected to oral administration of the other extract but of different concentrations. Last 10 mice will be subjected to oral administration of the concoction of different concentrations. The treatments will be administered 3 times daily, at 8am, 12noon and 8pm. Daily observations in terms of behaviour and symptoms are recorded.

Tithonia rotundifolia extract

Mice	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10
Extract Concentration	No addition of distilled water	2ml added	4ml	6ml	8ml	10	12	14	16	18
8.00am										
12.00 noon										
8.00pm										

Leonotis nepetifolia extract

Mice	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10
Extract Concentration	No addition of distilled water	2ml added	4ml	6ml	8ml	10	12	14	16	18
8.00am										
12.00 noon										
8.00pm										

Concoction of the 2 extracts

Mice	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10
Extract Concentration	No addition of distilled water	2ml added	4ml	6ml	8ml	10	12	14	16	18
8.00am										
12.00 noon										
8.00pm										

h) Blood samples from each mouse will be taken and the number of malaria parasites will be counted after every three days of administration of each treatment and recorded separately for each treatment. Once adequate data has been obtained, a graph of concentrations of each treatment against the number of parasites per ml of blood can be used to analyse the data.

F. Recommendations

Further research can be done on isolation and characterisation of active compounds that are specifically responsible for anti-malarial properties or vaccine properties as well as their mode of action.

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Overseas travel population: a challenge for malaria response in China

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Abstract:

Malaria is a parasitic disease which was transmitted by the bite of mosquitos in the population. With the rapid development of China's economy in recent years, there is a substantial increase on the number of workers and travelers going abroad, therefore, oversea imported malaria has been becoming a rising public health problem of concern, since these people might get infected by malaria before returning back to China.

The field survey in Shanglin county of Guangxi in 2013 showed that the malaria attack rate was 21.6% among high-risk groups of oversea workers, and the proportion of asymptomatic infection among all positive *Plasmodium* infection was 34.4%. One study on imported malaria in nine provinces of China presented that overseas labors accounted for 82.1% of all imported malaria cases. The nationwide surveillance program on malaria revealed that a total of 55.4% of imported malaria cases were hospitalized for treatment, which was significantly higher than that of the local cases (18.6%) (OR=5.0, 95%CI=4.4-5.8). The hospitalization proportion of imported *P. falciparum* and *P. vivax* cases returning from African are significantly higher than those coming back from Southeast Asia ($p < 0.001$). An average of 24.6 malaria deaths was reported nationwide, with the fatality rate of 6.9 ‰, which were mainly returned from Africa (89.9%).

National control strategy on imported malaria in China should be urgently developed to reduce the risk of oversea infection of malaria, improve the timeliness and accuracy of case diagnosis, so as to reduce the incidence of hospitalization and death when the cases returning back to China.

Co-dispersal of the blood fluke *Schistosoma japonicum* and *Homo sapiens* in the Neolithic

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Abstract:

The global spread of human infectious diseases is of considerable biomedical and public health interest (1-5). Little is known about the relationship between the distribution of ancient parasites and that of their human hosts. As one of the three major species of schistosome blood flukes infecting humans, *Schistosoma japonicum* is prevalent in East and Southeast Asia, including the People's Republic of China, the Philippines and Indonesia. We studied the co-expansion of *S. japonicum* and its human definitive host. Phylogenetic reconstruction based on complete mitochondrial genome sequences shows that *S. japonicum* radiated from the middle and lower reaches of the Yangtze River to the mountainous areas of China, Japan and Southeast Asia. In addition, the parasite experienced two population expansions during the Neolithic agriculture era, coinciding with human migration and population expansion. The data indicate that the advent of rice planting likely played a key role in the spread of schistosomiasis japonica. Moreover, the presence of different subspecies of *Oncomelania hupensis* snails in different localities in Asia allowed *S. japonicum* to survive in new rice-planting areas, as well as driving intraspecies divergence in the blood fluke.

Diagnostics of schistosomiasis by antigen-detection (CAA and CCA): the quest for a single worm

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Abstract:

The renewed interest in mapping, intensified control and elimination of schistosomiasis (World Health Assembly Resolution WHA 65.21) has put the need for highly accurate diagnostic assays high on the agenda. Based on the well-studied schistosome antigen detection (CCA and CAA) ELISA's, a visual, field-friendly point-of-care urine test for CCA and a quantitative, ultra-sensitive reader-assisted assay for CAA have been developed. The CCA test is commercially available and may replace the Kato-Katz for prevalence mapping of community-level *S. mansoni* infections using a single drop of urine and also allows quick evaluation within days of treatment efficacy. The recently developed test for CAA is applicable to serum or urine of all schistosome species at sub-pg levels, which allows finding single worm infections. The assay has been transformed into a robust, dry-reagent test, used in several low-resource settings in Africa. In combination with optimized sampling schedules the CAA could rapidly identify foci of low prevalence/intensity of all human schistosome infections. Recent studies using the 2 ml urine format show that in near-elimination settings in China, South-East Asia, Africa and Brazil, prevalence of active schistosome infections by egg microscopy may be underestimated up to 10-fold. Also, decrease of CAA serum and urine levels after treatment has been shown in all effectively treated cases, however complete cure rates are very limited. The CAA strip assay therefore presents itself as a highly accurate diagnostic tool, with a clear value for application in control and elimination settings.

Key words: Schistosomiasis; Diagnosis; Ultra-sensitive tests; CAA; CCA; Circulating antigens; Elimination; Low endemic settings;

The abstract submission for the "*Third Symposium on Surveillance Response System Leading to Tropical Diseases Elimination*"

Improved Malaria Surveillance in Myanmar

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Background

As Myanmar moves toward a more targeted approach to malaria control and prioritize malaria elimination as medium term objective, strengthening malaria surveillance plays essential role in the national malaria strategic plan. In June 2014, Myanmar introduced a malaria implementation plan focused on data management developed jointly by the National Malaria Control Programme (NMCP) and Malaria Consortium (MC) to strengthen malaria surveillance. .

MC provided technical assistance and capacity building support to the NMCP for implementing this new surveillance tool and strengthen data collection, linking reporting by basic health staff and community health workers with rapid response. In the process, Microsoft Excel using relational database was upgraded to ACCESS for patient-level data and linked with an online dashboard to provide data access at all levels of decision-making.

Activities

An ACCESS surveillance database tailored to the existing technology in Myanmar and which could be transitioned to more comprehensive databases was developed and piloted in two townships and one State at sub-national level in 2015. Following acceptance at each level of NMCP, the database system has been rolled out in 106 townships in Myanmar (February 2016). During the rollout, strong emphasis was given to build capacity by training national malaria staff and WHO's data assistants.

A cloud-based data system, enabling national, sub-national and township level data sharing was incorporated into the design. A password-protected interactive dashboard using R/Shiny is used in the on-going roll out of the database to map all patients tested for malaria and confirmed malaria cases.

Results

- Developed a user manual of ACCESS Malaria Diagnosis and Treatment database.
- Set up a system at NMCP to collate, analyse and present data from all levels.
- Capacity building for 60 national malaria staffs and 52 WHO data assistants to use the new surveillance tools
- Developed cloud-based reporting in Google Drive to improve sharing data more effectively between the national and sub-national levels
- Developed malaria dashboard for online exploration of malaria data with summary tables and mapping of public health delivery units and suspected cases tested/confirmed.

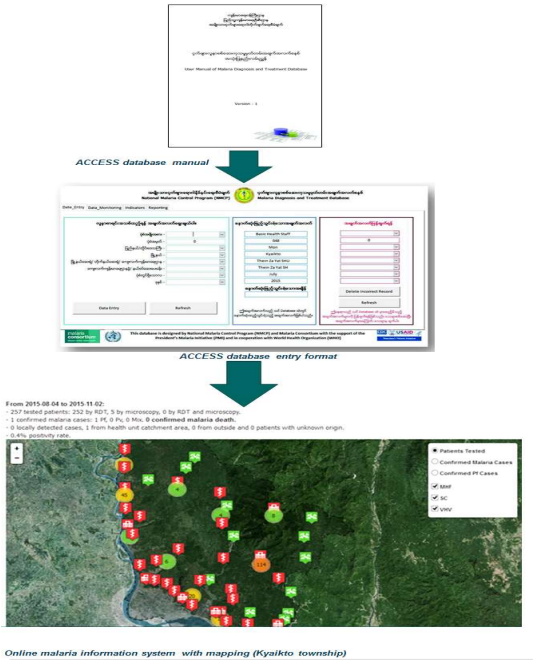

Figure 1: Outputs of ACCESS surveillance database

Recommendation

This updated malaria information system covers data entry, analysis, reporting, mapping of patient diagnosis and treatment data at different levels. Further expansion of the new database system requires additional resources. New technology is required to integrate essential commodities, micro-stratification and entomology

data to meet the relevant objectives in the new "National Strategic Plan for Malaria, Myanmar (2016-2020) to move towards malaria elimination".

Conclusion

The ACCESS surveillance database offers an excellent flexibility by integrating existing data and allowing the inclusion of different types of data, and its design facilitates the future integration of vector control data and/or other malaria data. The reporting in Google Drive offers a robust solution for backup and synchronization at all levels at the same time. It is important to extend this improved surveillance system in pre-elimination/ elimination areas so patient level data is collected and used for real-time response.

Keywords: malaria, surveillance, elimination, Myanmar

Genome-wide scans for the identification of *Plasmodium vivax* genes under selection

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Abstract:

Currently in China, the trend of *Plasmodium vivax* cases imported from Southeast Asia was sharply increased, especially in the China-Myanmar border (CMB) area. Locally genetic diversity and selection on *P. vivax* may be due to differences in drug pressure and host immunity. However, little is known about the genetic diversity and evolutionary plasticity of *P. vivax* in this area.

Here we report a genome-wide survey of *P. vivax* population in CMB area, using blood samples from local patients with malaria and reference isolates, to identify local population-specific selective processes. Our PCA result showed that *P. vivax* clustered generally according to their geographic origin and the host switch was not a major determinant of the genetic diversity. On whole genome scale, we estimate π to be 0.0082, and the genetic diversity is lower in exonic regions but higher in intronic and intergenic regions. We then use the standardised integrated haplotype score (iHS) for all SNPs in the CMB samples and identify the top 1% (iHS >5.93). Most of them involved gene families associated with red blood cell invasion and immune evasion. These positive selection signals suggested that *P. vivax* in CMB area were facing more pressure to survive than any other region, led to higher ratios of diversity in those genes that associated with host-parasite interactions.

Overall, our study suggested a greater genetic diversity and faster evolution in *P. vivax* from CMB area. Also, we found strong signals of positive selection in vaccine targets and drug resistance genes.

Others

Bacteriological investigation of the infectious risks in a semi-public biomedical laboratory in Benin (West Africa)

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Abstract:

Biomedical analyses laboratories represent particular sector of healthcare systems whereby professionals are especially exposed to high infectious risks. This study assessed the level of hygiene in the biomedical laboratory of a regional semi-public hospital from May 18th to August 18th, 2015. A checklist of good laboratory practices was developed on the basis of laboratory inspection checklist of the World Health Organisation. The laboratory was divided into two sub-sections A1 and A2. 91 swabs were collected from the two main sections. All these samples were then submitted to bacteriological analyses. Hygiene is poorly observed in the section A1 than A2. Similarly, the framework, the waste management practices and technical arrangements are in disagreement with biosecurity rules. After culture, 55 samples showed growth. Coagulase negative *Staphylococcus* (57.58%) were the most isolated bacteria from hands. Using the EPI-INFO Version 7 software, the Chi^2 test or Fisher exact test was used depending on the sample size. These tests help to assess differences between positive and negative scores by categories of questions within each laboratory. Cell phones were essentially contaminated by *Pseudomonas aeruginosa*, *Enterobacter cloaceae*, *Klebsiella pneumoniae* and *Acinetobacter spp* in equal proportions of 25%. *Escherichia coli* were the predominant isolates from the work surfaces (83.33%). All door knob samples were contaminated by *Escherichia coli* (100%). Almost all these isolates were multidrug resistant. With respect to the strategic place of laboratories in the sanitary system of a hospital, urgent and appropriate measures must be taken to mitigate the risk of laboratory acquired infections among professionals.

Key words: Infectious risks; Multidrug resistance; Bacteria; biomedical laboratories

Comparative study of infectious risks in diagnostic laboratories between public and private hospitals in Benin

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Abstract:

Introduction: Laboratory associated infections are serious occupational hazards for laboratory workers who are exposed through various routes. The present study aimed to evaluate and compare the bacteriological risks encountered at diagnostic laboratories in public and private hospitals in Southern Benin.

Methodology: A scorecard of laboratory practices was developed based on WHO laboratory inspection checklist. The private laboratory was split into two sections B1 and B2 and the public in C1 to C5. A total of 125 swabs from hand, cell phones, work surfaces and door knobs were collected from all laboratories and submitted to bacteriological analyses.

Results: Apart from some sections of the public laboratories where poor sanitation was noticed, the overall hygiene level are satisfactory in both hospitals even though the private laboratories were significantly safer ($p<0.05$) than the public ones (68.55% and 55.81% respectively). Bacteriological investigations showed that mobile phones were the most contaminated items in the private labs while work surfaces harboured more germs in the public laboratories.

Although private laboratories were contaminated by over 11 bacteria species against 5 from the public labs, coagulase negative *Staphylococcus sp*. were the most prevalent isolated organisms from both hospitals. All the isolated bacteria form public and private laboratories were multidrug resistant.

Conclusions: Though the hygiene level in the private labs was better than in public labs, the risk of lobaratory associated infections is rampant in both areas with respect to isolated organisms. Serious safety instructions and monitoring must be set to avoid worse situations especially because all isolates were multidrug resistant.

Key words: Laboratory associated infections; private/public hospitals; diagnostic laboratories; Benin

Multiple drug resistant malaria and its effects on hemoglobin and CD4-lymphocytes of HIV-seropositive pregnant women at Kaduna state, Nigeria

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Abstract:

Background: Severe malaria and HIV coinfection is a disastrous syndemism with heightened hematological consequences and poor clinical outcome especially in the face of antimalarial resistance and pregnancy. This study explored the antimalarial susceptibility pattern of pregnant women with severe malaria parasitaemia/ HIV coinfections and determine its impact on participants' hemoglobin concentration and CD4+ cell counts.

Materials and Methods: This was a case-control retrospective study carried out in three government-owned secondary hospitals at Kaduna State, Nigeria between 2nd February to 28th April, 2015. This study was approved by the ethical research committee of Kaduna state ministry of health. EDTA anticoagulated blood samples were collected from 380 pregnant women attending these hospitals. Out of them, 2 study groups were selected; 18 HIV infected women with severe malaria parasitemia as test participants and 23 HIV-uninfected with severe malaria as control participants. Malaria microscopy and HIV screening was conducted based on WHO recommended protocols while antimalarial susceptibility tests (using chloroquine, artesunate, artether, sulfadoxin-pyrimethamine, quinine), CD4+ cell counts and hemoglobin concentration were conducted using schizont maturation assay, flow cytometry and methemoglobin methods respectively. Multiple-drug resistant malaria parasitemia (MDRSMP) was defined by resistance against all the test antimalarial drugs.

Results: Forty-one (41) women had severe malaria parasitemia (SMP) (10.7%). 8 (44.4%) women with SMP/HIV coinfections had MDRSMP while others were susceptible ≥ 2 of the antimalarial drugs (55.6%). None of the control participants had MDRSMP. Women with MDRSMP had significantly low hemoglobin concentration (7.1±1.8 g/dl), low $CD4^+$ cell counts (209±43 cells/ mm^3), when compared with the control counterparts (10.8 ±1.89 g/dl and 431± 57.4 cells/mm^3) ($p < 0.05$). Antimalarial resistance was significantly correlated with severe malaria/HIV coinfection (r= 1.99, p =0.025) and low hemoglobin concentration (r = -1.25, p = 0.03) but not with $CD4^+$ cell counts (r = -2.44, p = 0.075).

Conclusion: MDRSMP /HIV coinfection in pregnant women exists in Nigeria. In the absence of appropriate and prompt clinical interventions, MRSMP/HIV coinfection will most likely lead to severe anemia and immunodeficiency. Malaria infected pregnant women especially those with HIV coinfections should be periodically and closely monitored for presence of antimalarial resistance.

Key words: Anemia; Immunodeficiency; Coinfection; Syndemism

The geospatial range of *Fasciola hepatica* and *F. gigantica* in Asia based on climate effects

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Abstract:

Using geographic information systems (GIS) methods, preliminary risk models based on known biological requirements of *Fasciola hepatica* and *F. gigantica* and a *monthly* long term normal climate grid suggested that thermal regime of a study site in Dongtu, Anhui, China can support overlapping presence of both species. Analysis of *daily* climate data from Wuhu, China and forecast parameters for *F. hepatica* previously used to develop risk models in the USA indicated that soil moisture and thermal conditions for life cycle progression of *F. hepatica* occurs in March-May. The optimum temperature for develop-ment of free-living stages of *F. hepatica* is 18^{o}C; sustained temperatures >23^{o}C have been reported to be unsuitable for *F. hepatica*. The optimum temperature for *F. gigantica*, a tropical species, is 25^{o}C; its usual habitat in deeper water bodies are less subject to summer drought than *F hepatica*. Results suggest a spring transmission pattern, where the first sustained drought of summer (over 2 weeks) ends transmission with aestivation and high mortality of snail hosts. Snails emerge from soil in fall-winter with return of wet conditions and begin a spring reproductive effort\. Results are consistent with weak annual transmission of *F. hepatica* in Anhui. Lymnaeid snail hosts of both *F.hepatica* and *F. gigantica* were found on study farms in Dongtu. Surveys on three separate dates, however, revealed low prevalence of only *F. hepatica* based on egg size measurements in cattle and goats, and moderate *Schistosoma japonicum* egg counts.

Antitumor inhibitory activity of *Azadirachta Indica* seeds on KB3-1 cell line

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Abstract:

Cancer is one of the leading sources of death in the world after cardiovascular disease. Estimates chose that, 84 million (15%) of deaths per year are due to cancer and if nothing is done, that rate will increase dramatically between 2015 and 2020 in under developing country, as well as in Asia, Latin America and Africa. In fact Cancer is a disease characterized by an anarchic and uncontrolled multiplication of abnormal cells. Many therapeutic strategies targeting mainly the cancerous cells are used to eliminate or to limit the pathological process. Of all currently used therapeutic approaches, of more importance to us is chemotherapy such as cytostatic drugs e.g: vandetanib). Our framework is concerned with the study of antitumor inhibitory activity of *Azadirachta indica* seed's petroleum ether and ethyl acetate extracts from the far-North region of Cameroon on KB3-1 cell line. Various components were isolated and purified firstly by maceration and later chromatographic methods. A total of five compounds viz MAAZ1, MAAZ2, MAAZ3, MAAZ4 and MAAZ5 were isolated. The cytotoxicity study performed with MTT test on the cervical carcinoma cell line KB3-1 showed that 60% (3/5 isolates) were active with IC_{50} equal to 5.4µg/mL, 14.85µg/mL, and 1.30µg/mL corresponding to MAAZ1, MAAZ2 and MAAZ3 respectively. The structural of the 3 active isolates were elucidated using spectroscopic methods (MS and NMR 1D & 2D). These include: Epoxyazadiradion, Azadiradione and Nimbolide which belongs to limonoïdes groups of triterpene's family. A comparative study of effective doses done with Vincristine from pervenche tree of Madagascar, Ivaline and Solamargine has shown that Epoxyazadiradione and Azadiradione are respectively 6.90 and 2.42 time effective than Vinchristine, where as Nimbolide is 28.7 time than Vincristine, 3.84 time than Solamargine and 1.38 time than Ivaline. Thus, certainly the antitumor inhibitory activity of *A. Indica* seeds is due to the presence of Nimbolide, Epoxyazadiradione and Azadiradione. But, further studies have to be done in order to know the mechanism of inhibitory activity of these compounds and to extend their actions in other cancerous cell lines such as Erythroblastoma, Glioblastoma (U373), mice Neuroblastoma cell (NIE-115), KBVI cell line and Osteosarcoma (143B.TK).

Key words: azadirachta indica, KB3-1cells, Epoxyazadiradione.

Assessing the rising cases of methicillin-resistant staphylococcus aureus: hospital and community-associated cases

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Abstract:

Methicillin-resistant Staphylococcus aureus (MRSA) has since become a major cause of illness and death in our healthcare setting. Risk factors for HA-MRSA include hospitalization, older age, invasive devices, and residence in long-term care facility, including exposure to antimicrobial agents. HA-MRSA isolates are often resistant to several antimicrobial drug classes in addition to beta-lactams. The CA-MRSA infections usually affects young, healthy persons and associated with sharing towels or athletic equipment, participating in contact sports, living in unsanitary and crowded areas, using illegal intravenous drugs.

Directions were given out for clinical microbiology laboratories to submit invasive isolates of MRSA to our unit, where we perform antimicrobial drug susceptibility tests on all isolates and characterize all isolates that were resistant to <3 non-beta-lactam antimicrobial drug classes. Most isolates were obtained from blood cultures.

The full model for predicting invasive infection with CA-MRSA compared with HA-MRSA included age, seasonality, and hospital exposure, plus specimen type. The only significant predictors of CA-MRSA infection compared with HA-MRSA were age <69 years, which was associated with increased risk ([OR] 5.1, 95% [CI] 2.06-12.64), and hospital exposure (OR 0.07, 95% CI 0.01-0.51), which was associated with decreased risk. Most patients were hospitalized for their infections and the proportion of patients admitted to intensive care units did not vary by strain. Patients infected by MRSA were younger than those infected by other strains.

The number of invasive MRSA infections reported and the number of invasive infections caused by CA-MRSA is on the increase. The increase of CA-MRSA poses a unique public health threat. It is now clear that CA-MRSA no longer causes only SSTIs but now causes an increased proportion of invasive infections in a rural state.

Parasitic disease prevalence and control in Sichuan, China

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Abstract:

Sichuan Province locates in the south-west of China, occupying an area of 485,000km2, governing 21 cities and 181 counties, consisting of 54 ethnic nationalities, with a total population of more than 80,760 million. The moisture and fertile soil provides a suitable environment for parasites to develop. There are many parasitic diseases prevalent in Sichuan such as Schistosomiasis , Paragonimiasis, Liver fluke disease; Echinococcosis ,Cysticercosis, Malaria, Kala Azar, Hookworm, Ascaris lumbricoides, Trichuris trichiura, Enterobius vermicularis.

Schistosomiasis is mainly prevalent in hilly and mountain areas distributing in 11 cities (prefectures) and 63 counties in Sichuan. There are 1767 patients at advanced stage at the end of 2015. But no acute patient and infected snails have been found for 10 years, no locally infected patient and cattle were reported for 5 years. There are 63 counties achieving the National Criteria for Schistosomiasis Transmission Interruption.

Echinococcosis is dominantly distributed in Ganzi, Aba Liangshan Prefectures and Ya'an city including 35 counties where Tibetans, Qiang ethnic minority and Yi ethnic nationality are the major inhabitants. A large number of dogs and nomadic production style maintain the transmission of echinococcus worms between dogs and domestic animals. An epidemiological survey conducted in 2012 showed the prevalence of echinococcosis (cystic and alveolar) was 1.08% in humans. The accumulative patients are 15410 in Sichuan at the end of 2015. All patients were given treatment except those who refused to receive the treatment. Chinese government launched a national hydatid disease control project in 2006, dogs were asked to treat with Praziquantel monthly and the dog infection decreased from 29.11% in 2006 to 0.65% in 2015 by coproantigen detection.

Malaria was fearful in the beginning of 50s in the last century with more than 580 thousand patients. But there was no locally infected patient found since 2011. Up to 2015, 110 counties were reported to eliminate this disease and all prevalent areas should be achieve the goal of elimination in 2017.

The infection of soil-transmitted nematodes in humans was 40.85% in 2004 in Sichuan province. After implementing of interventions with Albendazole treatment, health education, water supply and sanitation improving, the infection declined obviously. The average infection of hookworm, whipworm, roundworm and pinworm was 7.87%, 0.20%, 0.38% and 6.73% respectively in 2015.

In control, comprehensive measures have been implemented focusing on a government-dominated multi-sectoral cooperation model. Usually, the central government funds the control project while the local government is asked to provide the counterpart funding.

Infection of *Angiostrongylus cantonensis* lead to spleen atrophy and the change of $CD8^+CD28^-$ T cells/$CD38^+$ T cells of spleen in mouse model

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Abstract:

Background : *Angiostrongylus cantonensis(A. cantonensis)* infection can cause severe damage to the central nervous system(CNS). Increasing evidences show CNS injury has profound effects on the immune function of peripheral immune organs such as spleen. However, there are no systematical and comprehensive studies about the effect on spleen caused by the infection of *A. cantonensis.* In order to study dynamic effect on spleen, mice infected with *A. Cantonensis* were executed on 7day, 14dayand 21day, respectively, and we used the drugs albendazole treatment to clear infection. Methods of hematoxylin-eosin staining and flow cytometry were involved in our research. Spleen histology, subset distribution of splenocytes and dynamic expression of molecule CD28 and CD38 on splenocytes were examined to evaluate the immune states of spleens in infected mice. *A. cantonensis* infection caused severe spleen atrophy, which includes reduction in spleen weight and destruction of spleen structure. Infection also increased the proportions of $CD3^+$T cells, $CD4^+$T cells, and $CD8^+$T cells, while decreased the proportions of B cells and NK cells in spleen. At the same time, the increased percentage of $CD8^+CD28^-$ T cells and $CD38^+$ T cells were also observed after *A. cantonensis* infection. Meanwhile, albendazole treatment could reverse the changes of spleen and improve the function of spleen without returning back to normal status. Our study provides evidence that *A. cantonensis* infection can cause immune dysfunction in spleen, especially for the change of $CD8^+CD28^-$ T cells and $CD38^+$ T cells. Albendazole treatment could reverse spleen atrophy and T cell functional immune-supression to some degree. It is suggested that new therapy should be considered to improve the function of immune system and protect immune system from damage caused by angiostrongyliasis. Ourstudy may be useful to explore therapies of angiostrongyliasis.

Key words: *Angiostrongylus cantonensis*, albendazole treatment, spleenatrophy, CD28, CD38

Analysis to the reported paragonimus cases in Sichuan Province from 2007-2015

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Abstract:

Objective: To analysis the paragominus cases that reported by Sichuan Center for Disease Control and Prevention from 2007 to 2015 in purpose of realizing the pathological type of paragonimiasis, the situation of diagnosis and treatment, so that providing scientific evidence or control and prevention.

Methods: The paragomius case-reporting mechanism was established in 18 cities(states) of Sichuan province. Professional of disease control and prevention at all levels were detected cases of paragonimiasis, or hospitals reported cases of paragonimiasis, required to fill out the questionnaire of paragonimiasis cases and case report registration. Reported cases of Paragonimiasis from 2007-2015 were collected, then confirmed according to The Diagnosis of Paragonimiasis (The People's Republic of China, the Health Association Standard WS380-2012). The information of reported cases included age, gender, occupation, the main symptoms and laboratory results, treatment, misdiagnosis and etc.

Results: 137 reported cases of paragominus were collected from 2007-2015, located in Dazhou, Luzhou, and Yibin. The age of cases was mainly in 6-15 years age. The common clinical symptom was pulmonary extemal. The first diagnosis hospitals were county-level hospital. Patients were no prevention knowledge of paragominus.

Conclusion: The reported cases of paragominus were increased year after year. The prevention and control knowledge of paragominus should be popular to population of paragonimus endemic areas, and the The paragomius case-reporting mechanism should be improvement.

Key words: Paragonimus; case report; Sichuan