Early detection of malaria foci for targeted interventions in endemic Southern Zambia
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Ryan G. Davis
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Clive Shiff
Scaling Up Malaria Control in Zambia: Progress and Impact 2005–2008

Elizabeth Chizema-Kawesha, John M. Miller, Richard W. Steketee,* Victor M. Mukonka, Chilandu Mukuka, Abdirahman D. Mohamed, Simon K. Miti, and Carlos C. Campbell

• Documented significant reductions in burden of malaria
• and progress toward achieving ambitious goal of 80% population coverage rates for interventions including:
  – Insecticide-treated mosquito nets (ITNs) or indoor residual spraying (IRS)
  – Intermittent preventive treatment during pregnancy (IPTp) and ITNs
  – Prompt effective treatment of cases diagnosed by microscopy or rapid diagnostic tests (RDTs)
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Scaling Up Malaria Control in Zambia: Progress and Impact 2005–2008

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As the infection and disease become more focal, community techniques to map malaria cases and transmission and an approach of testing and treating the remaining infected population will be required.
Rural health centres, communities and malaria case detection in Zambia using mobile telephones: a means to detect potential reservoirs of infection in unstable transmission conditions

Aniset Kamanga¹, Petros Moono¹, Gillian Stresman², Sungano Mharakurwa¹ and Clive Shiff*²
Rural health centres, communities and malaria case detection in Zambia using mobile telephones: a means to detect potential reservoirs of infection in unstable transmission conditions

Figure 1 Elevation/Contour map of the Rural Health Centre Study Area in Choma/Namwala Districts, Southern Province, Zambia. Rural Health Centres collaborating are names and indicated. Drainage lines and river systems are indicated in categories. Category 1 is a simple drainage line that flows during and shortly after rain, Category 6 is a permanent large river.

Anopheles arabiensis predominate malaria vector in Southern Zambia
Transmission Zones

**Figure 2:** Graph showing the weekly incidence of diagnosed Malaria throughout an average year (January through December) at rural health centers in the Choma and Namwala Districts in Southern Province, Zambia. *The centers were separated into three zones based on locality, elevation and incidence patterns (See Figure 1 and Table 1).*

A Framework for Field Research in Africa

MALARIA EARLY WARNING SYSTEMS

CONCEPTS, INDICATORS AND PARTNERS

Source: http://www.rbm.who.int/
Timely detection of cases of illness in a community or region, above the normally expected level, is vital to ensure that health authorities and policy-makers are aware of the serious and immediate threat before them and to help them make decisions on effective control measures. Usually, an early detection system is based on malaria data recorded on a monthly or weekly basis within the health care facilities which are supposed to diagnose malaria and deliver effective treatment. If the surveillance system, laboratory procedures, data analysis, reporting and notification, are well established, control measures can be taken as soon as possible although inevitably there will be some delay after the onset of the epidemic.
EARLY DETECTION OF MALARIA IN AN ENDEMIC AREA: MODEL DEVELOPMENT

Supawadee Konchom¹, Pratap Singhasivanon², Jaranit Kaewkungwal², Sirichai Chuprapawan², Krongthong Thimasarn³, Chev Kidson², ⁴, Surapon Yimsamran² and Chaiporn Rojanawatsirivet¹

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The epidemic warning system was based on normal distribution using the monthly mean number of cases and the mean plus or minus two standard deviations (mean ± 2SD). The
EARLY DETECTION OF MALARIA IN AN ENDEMIC AREA: MODEL DEVELOPMENT

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The epidemic warning system was based on normal distribution using the monthly mean number of cases and the mean plus or minus two standard deviations (mean ± 2SD). The monthly cases were plotted if the number was more than the mean ± 2SD (Cullen et al, 1984). This method is not timely for detecting malaria epidemics which usually occur within a short period of time. Therefore, Poisson distribution was considered as an alternative method for developing an early detection model. Poisson distribution is the probable

Zonal Alert Thresholds

Figure 3: The Poisson distribution of the mean weekly incidence of malaria diagnosis in the floodplain

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Figure 4: The Poisson distribution of the mean weekly incidence of malaria diagnosis in the Transitional Zone

Zonal Alert Thresholds

**Figure 3**: The Poisson distribution of the mean weekly incidence of malaria diagnosis in the floodplain.

**Figure 4**: The Poisson distribution of the mean weekly incidence of malaria diagnosis in the Transitional Zone.

**Figure 5**: The Poisson distribution of the mean weekly incidence of malaria diagnosis in the Macha Heartland.

Example: Manguza RHC 2010

**Figure 6:** The 2010 weekly incidence of malaria diagnosis at the Manguza RHC as compared to the Macha Heartland zone weekly threshold level.

Discussion

• Rational for selecting Poisson technique
Discussion

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• Applicability of Poisson assumptions
EARLY DETECTION OF MALARIA IN AN ENDEMIC AREA:
MODEL DEVELOPMENT

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Malaria data fit the assumptions of the Poisson distribution well enough to generate an early detection system for malaria epidemics, and provide a better fit for monitoring the malaria situation within a limited time period.

Discussion

- Rational for selecting Poisson technique
- Applicability of Poisson assumptions
- Zonal thresholds: aggregation bias
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• As more data becomes available, individual RHC thresholds could be calculated and other methods could be tried.
Discussion

• Rational for selecting Poisson technique
• Applicability of Poisson assumptions
• Zonal thresholds: aggregation bias
• Inconsistent sensitivity: reliability?
• As more data becomes available, individual RHC thresholds could be calculated and other methods could be tried.
• Pilot study supports dry season applicability. Value in high transmission season remains to be seen.
A method of active case detection to target reservoirs of asymptomatic malaria and gametocyte carriers in a rural area in Southern Province, Zambia

Gillian H Stresman¹, Aniset Kamanga², Petros Moono², Harry Hamapumbu², Sungano Mharakurwa², Tamaki Kobayashi³, William J Moss³, Clive Shiff¹
Conclusion

- Reactive case detection strategies, triggered by weeks of aberrant incidence, could be useful for identification of silent reservoirs of malaria infection to limit the duration of “epidemic” periods and to interrupt the transmission to adjacent communities.
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• Reactive case detection strategies, triggered by weeks of aberrant incidence, could be useful for identification of silent reservoirs of malaria infection to limit the duration of “epidemic” periods and to interrupt the transmission to adjacent communities.

• The inconsistent sensitivity of the alert thresholds suggests additional years of surveillance data are needed before they could be considered operationally robust.
Conclusion (cont.)

• Until then, aberrant weeks during low transmission season, and during high transmission season at sites where the threshold is less sensitive, could feasibly be followed up for screening of family members.
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• Communities with high numbers of alert weeks could be reviewed for defaults in scaling-up interventions.
Conclusion (cont.)

• Until then, aberrant weeks during low transmission season, and during high transmission season at sites where the threshold is less sensitive, could feasibly be followed up for screening of family members.

• Communities with high numbers of alert weeks could be reviewed for defaults in scaling-up interventions.

• Similar RHC-level data collection should begin elsewhere in Zambia to facilitate ongoing control measures and to build the records necessary for early detection system development.
References


Special Thanks to...
Capstone Advisor: Clive Shiff
Academic Advisor: Daniela Lewy
Questions?