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## **Problems and Prospects for Integrated Disease Surveillance in India: A case study of Maharashtra State**

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The WHO advocated the integrated disease surveillance strategy (IDSS) in 1998 in order to overcome the problems with single disease approach. It is undoubtedly the most pragmatic approach in resource limited settings. However multiple challenges still overwhelm countries to grapple with the spread of communicable diseases. Identifying the reasons for the suboptimal functioning of a seemingly right strategy is the challenge to be investigated. Empirical evidence for its performance is limited; mainly available from the WHO-AFRO Region and none from the WHO SEARO region despite hosting the largest population in the world and contributing to the biggest epidemics of the current century. This dissertation is an attempt to address this important gap in communicable disease surveillance research. India adopted the strategy in 2004 through the Integrated Disease Surveillance Project funded by the World Bank up to March 2012. The IDSS in India is a three-tier decentralized state based system covering 21 diseases and syndromes with a focus on the district level. It collects data on syndromic, presumptive and lab confirmed cases of priority diseases through S, P and L reporting formats respectively from pre-identified public and private Reporting Units on a weekly basis in both urban and rural areas. The main objective of the dissertation was to analyze the structure and the performance of the IDSS in the 34 districts of Maharashtra state in India. It aimed to assess the functioning of the system; and to identify the necessary structural and programmatic alignments for its transition from an externally funded project to a state owned, state funded program. The study was a mixed method multi-centric cross sectional assessment survey conducted to collect both primary and secondary data at the state, district and reporting unit levels. All 34 District Surveillance Units in the state were included in the study. Multi-stage simple random sampling was done to identify 46 Reporting Units and 25 labs.

This study took an innovative and combined approach to design an all-inclusive holistic assessment using both the WHO and CDC guidelines. This was because CDC updated guidelines assess surveillance systems in terms of its quality attributes and are more suitable for single-disease system assessments but not for initial baseline assessments when data on infrastructure and actual implementation (input and process indicators) are required. The WHO 2001 protocol on the other hand, assesses the processes of implementation on core and support surveillance functions. It better suits multi-disease surveillance system assessments but is unable to assess quality attributes. The IDSS in Maharashtra was implemented seven years ago and a baseline state wide implementation survey was never conducted. At this advanced stage it was necessary to assess surveillance quality as well. The four main areas covered in this baseline assessment include the **structure and components** of the system; its performance with respect to **core surveillance functions** (case detection, case registration, case confirmation, case notification, data management, data analysis, outbreak preparedness, outbreak response, and feedback); **support surveillance functions** (manuals and guidelines, laboratory capacity; supervision; training; resources (financial, human, material and

equipment) and coordination); and **system attributes** (simplicity, flexibility, acceptability, usefulness, sensitivity, positive predictive value, representativeness, data accuracy, timeliness, consistency, stability and completeness) as identified by the WHO and the CDC. In addition a systematic literature review of 33 citations was conducted to analyze the evidence on structure and performance of integrated disease surveillance systems in 18 countries.

The findings of the study were in general agreement with those from the systematic literature review. The progress of the IDSS in Maharashtra with respect to both its core and support surveillance functions was satisfactory. Outbreak preparedness and response were the strongest components of core functions and were evident in the low case fatality rates. Disease thresholds were better understood at the reporting unit level (59%) than at the district (18%). However, none of the outbreak indicator targets were met. Submission of final outbreak report was the weakest. Data analysis was weak at both district and facility levels. Availability of financial resources was the strongest component of the support functions. Over the last seven years 46% under spending of sanctioned funds was noted. All other support functions were weak and affected core function performance. Contractual and part time positions; administrative delays in recruitment; vacancies (30%) and lack of training (50% personnel in position trained) were the main human resource issues that hampered performance. Limited laboratory capacity at all levels compromised case and outbreak confirmation. Only 53% of the districts could confirm all priority diseases identified under IDSS. Stool sample processing was weakest despite majority of the outbreaks being of acute diarrhoeal diseases. Availability of transport media, trained laboratory staff, and rapid diagnostic tests were the main challenges at peripheral facilities. Feedback and training was significantly better ( $p < 0.001$ ) at the district level (65%; 76%) than at the reporting unit level (15%; 37%). Supervision was better at the facility level (37%) than at the district (18%) and so were coordination; communication (especially internet connectivity) and logistic resources (especially electricity and vehicles). With respect to the system attributes, simplicity and flexibility of the system were the best and since IDSS is the only large scale surveillance effort in the state, its usefulness was indisputable. Significant progress was noted from 2009-2012 on timeliness (8-66%), completeness (21-77%) and consistency (8-66%) of reporting. Data accuracy (under reporting 4-44%) and representativeness were the poorest performing attributes. The sensitivity of reporting malaria was less than 50% and a low outbreak Predictive Value Positive (30%) led to wasted resources. Stability of the IDSS and its acceptability amongst private sector and urban Reporting Units was still phenomenally poor even after seven years of implementation.

Surveillance functions (both core and support) within the IDSS were intricately intertwined and mutual interdependencies influenced not only the outcome of the other but also affected surveillance quality. Findings of this study show that the IDSS in Maharashtra is a well conceptualized and robustly designed system. It has gradually evolved into a significantly strong and useful surveillance effort by the state. However, its mediocre performance despite a well-designed structure and the availability of adequate funds indicate that certain other barriers hinder its optimal functioning. Incomplete adoption of the original project implementation plan, which theoretically addressed a majority of the shortcomings identified in the assessment, is probably the main amongst them and its incomplete structural integration within the state health service system the other.

In order to avoid that the IDSS becomes another vertical program and to eliminate existing lacunae as identified in this study we suggest that the state and district surveillance units be

established as permanent structures within the state district health care system. Further, instead of providing IDSS as an additional charge to existing Additional District Health Officers who overlook multiple programs, *full* time positions for state and district surveillance officers should be created. Contractual hiring should be avoided. Once the structural integration is achieved, all support surveillance functions particularly laboratory structures, personnel training; logistic and communication equipment should be strengthened. An essential step in improving data quality within the IDSS is shifting data entry from the district to the facility level; eliminating email and paper data reporting and initiating automated data checks within the data portal. Provisions to include private and alternate medicine practitioners and to ensure urban data reporting are paramount in improving the systems representativeness. As a next step the IDSS should initiate automated outbreak detection because “they are too important to be left to human detection alone”.