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# Importance of intersectoral co-ordination in the control of communicable diseases, with special reference to plague in Tanzania

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## SUMMARY

Human health, agriculture, including livestock, energy, education, wildlife, construction, forestry and trade sectors are inter-related and their co-ordination is an important pre-requisite for successful control of most communicable diseases including plague. Similar linkage between research, policy, training and extension activities in each sector are essential for any successful control strategy. Inadequate agricultural produce, inaccessibility of people to the available food and ignorance on proper preparation and usage of available food materials are responsible for malnutrition, and malnourished people are very vulnerable to disease.

Irrigation schemes facilitate breeding of various disease vectors and transmission of some communicable diseases. Forests are ecologically favourable for some disease vectors and reservoirs for tsetse flies and rodents, while deforestation leads to soil erosion, lack of rainfall and consequently reduced productivity in agriculture which may result in poor nutrition of the population. Wildlife and livestock serve as reservoirs and/or carriers of various zoonoses including plague, trypanosomiasis and rabies.

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Lack of proper co-ordination of these sectors in communicable disease control programmes can result in serious and undesirable consequences. Indiscriminate killing of rodents in order to minimize food damage by these vermin forces their flea ectoparasites to seek alternative hosts, including man, a development which may result in transmission of plague from rodents to man. Similarly, avoidance of proper quarantine during plague epidemics, an undertaking which is usually aimed at maintaining economic and social links with places outside the affected focus, can result in the disease becoming widespread and consequently make any control strategies more difficult and expensive. It is generally concluded that inter and intrasectoral linkages are inevitable and close co-ordination between and within various sectors is essential for successful control of communicable diseases. Regular professional workshops involving researchers, extension officers and policy makers from all relevant sectors are recommended.

## INTRODUCTION

Health, in the context of this paper, is defined as a function of complete physical, mental and social well being rather than a mere absence of disease or infirmity. In addition to illiteracy and poverty, health is a major obstacle of development in most third world countries including Tanzania. Most national governments of these countries however, have indicated their desire to overcome these obstacles. In an endeavour to accomplish this, a lot of projects have been initiated from time to time. Their failures can be attributed, at least in part, to one or more of the following factors: lack of proper inter-sectoral as well as intrasectoral coordination, lack of proper feasibility studies, improper utilisation of available resources, poor or improper policies, management and administrative procedures, lack of adequate and relevant training of the implementers, lack of appreciation, adequate participation and involvement of the target population(s) and poor or lack of supervisory, monitoring and evaluation procedures.

Since maintenance of health depends more on social-economic factors than on its care services, revolutions that can bring about improvement in nutrition, hygiene, housing, environmental sanitation and the general standards of living are desirable.

In order to bring about these revolutions and consequently improve the general health status of populations, increase in life expectancy at birth, decrease in child mortalities and proper linkages of all relevant sectors are necessary. In most developing countries however, most activities aimed at alleviating prevailing health problems are hardly coordinated despite the fact that they are all intended to benefit the same target population. The overall result of uncoordinated projects is that the target groups benefit on one hand and suffer on the other. A good example is an irrigation scheme which may result in prevention of famine due to increased agricultural output but at the same time enhances morbidity due to increased transmission of water-borne diseases. Furthermore, on many occasions, research findings are not closely linked with policy making and project implementation machineries.

Since the basic objective of research is to explain, discover, improve or modify existing knowledge, attitudes and practices, the need for links between research, policy, training and extension is inevitable.

The objective of this paper is to highlight the problems and importance of inter and intrasectoral linkages in the control of communicable diseases in Tanzania, with special emphasis on plague. The paper also highlights the importance of linkages between research, policy and extension in the context of plague control in Tanzania.

## INTER-SECTORAL LINKAGES.

**Linkages between agriculture and plague control:** Poor nutrition is, among others, a major cause of ill health in most developing countries, including Tanzania. Inadequate agricultural produce in terms of quantity and quality, inaccessibility of people to the available food e.g. lack of sufficient incomes to meet prevailing prices or lack of appropriate facilities for transporting food materials from areas where the latter are ample to areas where they are scarce, lack of desire to consume the available food e.g. due to ignorance, cultural or religious taboos and improper preparation and utilisation of available food, are all responsible for malnutrition and malnourished people are more vulnerable to diseases than well fed individuals.<sup>1</sup>

Furthermore, many agricultural activities facilitate transmission of communicable diseases and make control of the latter difficult. Introduction of cotton as a cash crop in Chunya district in 1965 for example is

reportedly responsible for large increases of rodent populations in the area. Besides their annual consumption of about 35 pc of food and cash crops in the district and hence causing hunger that may lead to poor health conditions due to malnutrition, 1,14 pc of the animals are also naturally infected with plague.<sup>2,4</sup>

Poor storage of agricultural products provides rodents with access to food supplies and hence facilitates their survival, breeding and close contact with people, and consequently easy transmission of plague and other rodent borne zoonoses. According to John (1977 – Personal Communication), storage of hides and skins in people's dwellings in Mbulu District attracted numerous rodents into human habitations and consequently caused severe epidemics of human plague in the district from 1928 to 1930. Although these epidemics were somehow controlled, partly by burning dwellings whose owners contracted the disease, and isolating plague patients, the disease has persisted endemically to date.

Indiscriminate control of rodents as agricultural pests without proper collaboration with public health personnel may result in outbreaks of human plague due to escape of infected flea ectoparasites from the dead animals. This is exemplified by the first outbreak of the disease in the Western Usambara mountains which was preceded by rodent control operations organised by the District Agricultural Officer. These outbreaks could probably have been prevented if there had been proper coordination between the agricultural and public health sectors which would have ensured prompt control of rodent fleas and consequently prevented transmission of the disease from rodents to humans.

Conversely, health has some remarkable effects on agriculture. According to Goosen<sup>5</sup> and Muller,<sup>6</sup> malaria in Tanzania and guinea worm in West Africa are at their peaks during rainy seasons when most villagers would otherwise be working on their farms. Plague outbreaks in the Western Usambaras are maximal in January when the major agricultural activity is weeding maize, beans, potatoe and vegetable plantations.<sup>7</sup> As a result, most of the affected people are unable to work on their farms and hence agricultural productivity is reduced. Likewise, during an outbreak of plague, the affected area or house is normally quarantined, thus preventing the residents from working in farms outside their homesteads until the outbreak is over. Furthermore, in the event of death in a family, all the relatives, neighbours and in some cases all the villagers, spend a

few to several days at the funeral and mourning, thus doing nothing on their farms. The overall outcome of these health oriented factors is shortage of food and consequently malnutrition and ill health among the affected population.

**Linkages between livestock, wildlife and plague control:** Domestic pests, especially dogs are important carriers of plague in Tanzania and elsewhere and can serve as a source of infection to man.<sup>8-11</sup> Elsewhere, goats, sheep and camels have been incriminated for playing a similar role in plague epidemiology.<sup>12,13</sup>

Similarly, small wild carnivores and spring hares are efficient carriers of plague in many parts of the world including the United States, Tanzania and Zimbabwe.<sup>14-16</sup> The outbreak of human plague in Hai district in 1972 was reportedly introduced from the wilderness by a hunter whose two children were the first victims of the outbreak (Bhachu, 1974 – Personal communication). Intersectoral coordination between public health, veterinary and wildlife sectors in control of plague as well as other zoonotic diseases is therefore indispensable.

**Linkages between education and plague control:** Success in control of communicable diseases depends, to a large extent, on the awareness and full participation of the target community. It has been reported that the remarkable decline of the Black Death in Europe during the 19th century was due to the improvement of the health conditions of the people rather than a result of extrinsic factors.<sup>7</sup> Such improvement is, on the other hand, a result of appropriate education and understanding of the public. The long persistence of plague in the Western Usambara mountains, Tanzania has been partly attributed to the general belief by some villagers that the disease is caused by witchcraft or evil spirits.<sup>18</sup> This kind of belief can only be changed when the target populations acquire appropriate and adequate health education which is appreciable and acceptable to them. Simplified health education on plague epidemiology, spread and control, need to be offered to the public, influential groups such as traditional healers, birth attendants and religious leaders, specialised groups such as political leaders and administrators at all levels, teachers and women and individuals. Close co-ordination between health and education sectors to ensure inclusion and emphasis of the major aspects of communicable diseases in school curricula is therefore highly desirable.

As a result of ignorance, poisoning from handling or ingestion of dangerous pesticides including rodenticides and insecticides used in controlling disease reservoirs and vectors as well as crop pests cannot be ruled out.<sup>19,21</sup> Mishandling of plague infected animals while preparing the latter for culinary activities can also lead to human infection with plague.<sup>22</sup> Appropriate health – education linkages ensuring a thorough community awareness of the dangers involved in these activities can minimise these undesired consequences.

**Linkages between forestry and plague control:** Deforestation for agricultural activities or any other developmental projects disturbs the natural ecology of rodents, and compels the latter to seek alternative residence in or close to human habitations. This results in close contact of these animals and humans and hence facilitates transmission of plague between rodents and man in places where the disease is endemic. This is exemplified by the current distribution of plague in the Western Usambara mountains which has so far involved only those areas which underwent extensive deforestation during the early sixties. These areas which comprise Mlalo, Mlola, and Mtae divisions as well as small parts of Lushoto division, are well connected with the rest of the district by fairly good roads despite the natural boundaries of mountain ranges and patches of natural forests. Besides facilitating close contacts between rodents and people, deforestation also leads to soil erosion, lack of rainfall and reduced productivity in agriculture which may result in poor nutrition in the population and consequently increased vulnerability to diseases including plague.

In most deforested areas of Lushoto district, Guatemala grass is planted to control soil erosion and serve as animal feed. The plant however, provides suitable harbourage for rodents and hence facilitates plague transmission. On the other hand, forests which are close to human habitations also facilitate transmission of plague and other zoonoses from sylvatic to murine environments. In view of these relations, close inter sectoral coordination between forestry and health services is very important in plague control.

**Linkages between construction and plague control:** Construction of roads, railways, villages and/or other structures in uninhabited land is usually accompanied by rodent infestations. Most of the rodent infested villages in Chunya and Lushoto districts in which plague is also endemic were recently established and

they were mostly built in newly cleared areas which were not habited before. Introduction of *Rattus rattus* to Tanzania is reportedly connected with the importation of various materials from India during the construction of the Tanga and Central railway lines in the country.<sup>23</sup>

Furthermore, roads and railways enhance communication between plague foci and other parts of a country and hence facilitate transfer of the disease from infected to non-infected areas. Construction of non-rodent proof structures such as food stores, food factories and residential houses can also provide suitable harbourage for domestic and semi-domestic rodents and hence close contact of these animals and man. It therefore follows that proper coordination between construction and public health sectors can, to a large extent, minimize spread of plague and have a positive impact on control strategies of the disease.

**Linkages between trade and plague control:** Trade has, for a long time, been well correlated with plague dissemination and control. The fast and world wide spread of the Black Death between the 14th and 19th centuries was mostly facilitated by commercial vessels sailing from Asia to Europe and elsewhere.<sup>24</sup> A fatal outbreak of plague which occurred in Zanzibar in 1905 originated from a commercial ship carrying rice from India via Durban.<sup>25</sup>

Failure to maintain proper quarantine measures during plague outbreaks in the Western Usambara mountains is probably responsible for the spread of the disease from one village in 1980 to about 52 villages in 1992. This is partly attributed to the commercial attitudes of many villagers in the affected areas who seem to believe that they cannot survive without travelling and trading their agricultural products.<sup>26</sup> It is therefore desirable to formulate and maintain close coordination between the health and trade sectors and hence ensure that during outbreaks of plague, trade is well controlled and done in such a way that it does not aggravate the spread of the disease.

**Linkages between energy and plague control:** Case finding, early reporting and prompt treatment of plague patients are essential steps in preventing the spread of the disease. These steps can only be effectively accomplished if there are sufficient means of communication including transportation which apparently requires fuel energy. The ever increasing oil prices have negative effects on transportation, espe-

cially in developing countries whose economies are very poor, and adversely affect the control strategies of communicable diseases such as plague. The Permanent Plague Control Team (PPCT) members in the plague affected Lushoto district could not visit all the affected villages as often as had been expected during the three years of initial operations (July 1987 to June 1990), due to lack of fuel and/or spare parts for the project motor cycles. Moreover, only two of the initially planned four motorcycles were procured. As a result of failure to visit villages frequently during the three year period, some cases were reported late. Indeed most fatal cases were either reported to the Health authorities late or died at their homes before being attended.<sup>27</sup>

Additionally, distribution of rodenticides and insecticides to the affected villages was not always according to schedule due to fuel (energy) problems. Likewise, frequent power cuts in Lushoto district have, in many occasions, affected prompt examination of plague specimens since the microscopes operate on electric energy. A cheap and consistent supply of energy especially fuel, would therefore enhance plague control activities.

#### **INTRA-SECTORAL LINKAGES.**

Intra-sectoral linkages are, in many cases, either missing or weakly existent in most developing countries. Control of one communicable disease can easily be modified so that several diseases are simultaneously controlled if proper coordination is planned and implemented. Residual spraying of houses for controlling mosquito vectors of malaria and Bancroftian filariasis can also be effective against some flea vectors of plague if the operation is extended to cover house floors, beddings, ceilings and animal houses where human, domestic animal and commensal rodent-fleas are likely to be in contact with the insecticide.

Furthermore, coordination of research activities in various communicable diseases in many countries, needs to be strengthened since it is the researchers that are expected to come up with strategies for effective control of the problems. In order to strengthen these activities, a Communicable Disease Centre in which scientists working on various communicable diseases can work together and hold frequent scientific discussions, seminars, etc. is desirable. Such a move would also enhance joint use of expensive equipment which would otherwise be difficult for the currently scattered research centres or stations to possess. Additionally,

such a set up would serve as a "reference centre" for communicable diseases research and control, and consequently facilitate investigations aimed at establishing the biological nature of the long persistence and repeated outbreaks of human plague in Tanzania since 1980.

**Linkages between research, policy, training and extension:** In order to control any communicable disease effectively, close coordination between research, policy and training and extension services is necessary. In many developing countries however, major policies are mostly based on the wish of the dominant groups in the decision making process rather than on research findings. Furthermore, research findings are not adequately communicated to the target populations for consumption. This can be partly attributed to lack of strong coordination between research, training and extension services.

The persistence of plague in the Western Usambara mountains for over a decade exemplifies communicable disease control problems that are attributable to lack of inadequate coordination between the above sectors. Recommended research on the bacteriology of the local strain of *Yersinia pestis* has not been implemented since policy makers have not agreed to supply funds for the purpose. Similarly, rodent and flea control activities are, in most cases, not implemented fully since funds for purchasing the pesticides recommended by research findings to supplement those granted by donors and for paying allowances to dusting staff are not regularly provided. Furthermore, training of extension personnel and the affected community is not effected as often as formerly planned due to lack of funds. Indeed some of the extension staff who were stationed in the affected villages left their stations due to similar reasons. Also, failure to enforce proper quarantine measures in the affected villages, a fact which is probably responsible for the wide expansion of the focus since the first outbreak of the disease in the district in 1980, is partly attributable to lack of close coordination and collaboration between the health and policy making sectors. In fact it is the latter's responsibility to ensure provision of the essential requirements for the population and enforcement of quarantine measures recommended by experts.

**Conclusions and recommendations:** It is justifiably conclusive from the foregoing information that inter and intra-sectoral linkages are important and that close coordination and collaboration between and within various sectors are an essential pre-requisite for suc-

cessful control of communicable diseases. It is also concluded that research, policy, training and extension activities are inter linked and that their coordination in communicable disease control is essential.

In order to enhance these linkages and facilitate close coordination, it is recommended that professional gatherings should be organised regularly and involve experts from all sectors which are inter-linked in disease control. It also recommended that sectoral scientific meetings and seminars involving researchers, trainers and extensionists of the particular sector should be organised frequently.

#### REFERENCES

1. Mgaza O. Nutritional problems and policy in Tanzania. Cornell International Nutrition Monograph Series. No. 7. Cornell University Programme in International Nutrition 1980.
2. Taylor KD. An outline of the rodent pest problem in Tanzania. An unpublished report on a two week visit in 1978, presented to the Tanzania Ministry of Agriculture, November, 1978.
3. Lund M. Report on DANIDA consultantship concerning rodent problems in Chunya District, Mbeya Region, Tanzania. Ministry of Agriculture, Dar es Salaam, November 1977, (Unpublished).
4. Kilonzo BS. The origin, dissemination and present status of plague in Tanzania. *Dar Med J* 1981;2:130-42.
5. Goosen THJ. Malaria in the Mtera Area. Annual Report of the East African Institute of Malaria and Vector-Borne Diseases, January 1974-December 1975.
6. Muller (1981): In: Maxwell (1984).<sup>21</sup>
7. Njunwa KJ, Mwaiiko GL, Kilonzo BS, Mhina JIK. Seasonal patterns of rodents, fleas and plague status in the Western Usambara Mountains, Tanzania. *J Med Vet Entomology* 1988; 17-22.
8. Rust JH, Cavanaugh DC, O'Shita R, Marshall JD. The role of domestic animals in the epidemiology of plague. (i) Experimental infection of dogs and cats. *J Infect Dis* 1980;124:522-6.
9. Kilonzo BS. Studies on determining the involvement of domestic animals in plague epidemiology in Tanzania. (ii) Specific plague antibodies in sera of *Canis familiaris*, the domestic dog. *Tanz Vet Bull* 1980;2:56-9.
10. Kilonzo BS, Gisakanyi ND, Sabuni CA. Involvement of dogs in plague epidemiology in Tanzania: serological observations in domestic animals in Lushoto district. *Scand J Inf Dis* 1993;25:503-6.
11. Rust JH, Miller BE, Bahmanyar M, Marshall JD, Purnaveja S Jr, Cavanaugh DC, Hla ST (1971b). The role of domestic animals in the epidemiology of plague. (iii) Antibody to *Yersinia pestis* in sera of dogs and cats. *J Inf Dis* 1971;124:527-31.
12. Christie AB, Chen TH, Elberg SS. Plague in camels and goats: their role in human epidemics. *J Inf Dis* 1980;141:724-6.
13. Morbid. Morbidity and mortality. Weekly Report of 31 August 1984: Veterinary Plague. *Medicine Digest* 1984;10:27.
14. Poland JD, Barnes AM. Plague. CRC Handbook Series in Zoonoses. Steele JH, editors. CRC Press, Inc. Boca Raton, Florida 33431, 1979.
15. Kilonzo BS. Studies on the present status of endemicity, mammalian reservoirs and flea vectors of plague in Tanzania. Ph.D. Thesis, University of Dar es Salaam, 1984.
16. Taylor P, Gordon DH, Issacson M. The status of plague in Zimbabwe. *Ann Trop Med Parasit* 1981;75:165-73.
17. Wu Lien Teh JWB. A treatise on pneumonic plague. Publications of the League of Nations. (iii) Health. Geneva, May 1926.
18. Kilonzo BS, Mhina JIK. The first outbreak of human plague in Lushoto district, North east Tanzania. *Trans Roy Soc Trop Med Hyg* 1982; 76:172-7.
19. Laurell (1980): In: Maxwell (1984).<sup>21</sup>
20. Jeyarathan *et al.* (1982). In: Maxwell (1984).<sup>21</sup>
21. Maxwell S. Health, nutrition and agriculture: linkage in farming systems research. IDS Discussion Paper 198, 1984.
22. WHO weekly Epidemiological Record No. 31 of 3/8/79.
23. Msangi AS. Observations on the endemicity of plague in Tanzania. Ph.D Thesis, University of London, 1968.
24. Hirst LF. The conquest of plague: a study of the evolution of epidemiology. 1st ed. London: Oxford University Press, 1927;1-20.

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JOURNAL OF MEDICINE

25. Spurrier AH. The outbreak of plague in Zanzibar in 1905. A special report presented to the Sultan of Zanzibar and King of England by the Health Officer and the First Minister of the Zanzibar Government, March, 1907.
26. Kilonzo BS. Recent advances in the epidemiology and control of plague in Tanzania. Proceedings of the 11th Annual Scientific Conference of the Tanzania Public Health Association, Dar es Salaam, November 1992 (In press).
27. Fupi F. Hali ya ugonjwa wa tauni kabla ya mradi wa tauni Lushoto, Juni 1980 – Juni 1987. Unpublished paper presented at a Review Workshop on Plague in Lushoto, September, 1988.





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