

## ORIGINAL PAPER

# Towards a Sustainable Wild Poliovirus Containment Strategy in Zambia

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## ABSTRACT

**Objective:** The main objective of the survey and inventory of laboratories was to identify laboratories storing Wild Polio Virus (WPV) or potential infectious materials as a last step in contributing to sub-regional efforts in attaining a polio free status and the eradication of poliomyelitis in Zambia.

**Methods:** An adapted WHO generic protocol was used by the National Task Force (NTF) on Poliovirus Containment in Zambia to identify all bio-medical laboratories in Zambia. A questionnaire sent to all biomedical laboratories was used to identify laboratories storing WPV or potential infectious materials. Further physical inspection was done on some laboratories.

**Results:** Of the 170 biomedical laboratories in Zambia, 104 (61.1%) responded and 24 were identified as potentially storing infectious materials for WPV. Only one laboratory, the Virology Laboratory, University Teaching Hospital, Lusaka was noted to store both WPV and potential infectious materials.

**Conclusion:** The Ministry of Health through the NTF has set an impressive system in the laboratory containment of WPV and potential infectious materials in Zambia. Appropriate bio-safety containment and restricted access to stored materials containing WPV at the Virology Laboratory in Lusaka is a major step in the eradication of poliomyelitis in Zambia. Containment of these infectious materials will be particularly important in the post oral polio vaccination cessation era as there will be a large

population of unimmunised children in the community who will be susceptible to polio.

## INTRODUCTION

In May 1999, the World Health Assembly urged member states to begin the process leading to laboratory containment of wild polio virus (WPV).<sup>1</sup> The Global Commission for the Certification of the Eradication of Poliomyelitis will declare the world polio free when all regions have documented the absence of wild poliovirus transmission for at least 3 consecutive years and when laboratories with wild poliovirus-containing materials have implemented appropriate containment conditions.<sup>2</sup> In October 2005, "Documentation for the Certification of Poliomyelitis Eradication for Zambia" was accepted by Africa Region Certification Committee (ARCC) of the World Health Organisation.<sup>3</sup> Although Zambia is "polio free" the region is not polio free as some neighboring countries still have wild poliovirus transmission and therefore Zambia is at risk of wild poliovirus importation. The last documented cases of WPVs in Zambia were in 1995.<sup>4</sup> Over the past two years, transmission of indigenous WPV types 1 and 3 has continued in geographically limited areas in four countries namely Nigeria, India, Pakistan and Afghanistan.<sup>5</sup> Countries with low coverage of routine immunisation and rather weak health delivery systems in central Africa and the horn of Africa have also been affected.<sup>5</sup>

Laboratory survey and inventory is referred to as Phase 1 in the poliovirus containment, and describes the initial steps towards containment and covers the period when the number of polio-free countries and regions are increasing.<sup>2</sup> The National Task Force (NTF) on Poliovirus

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Containment was constituted in 2002 by the Minister for Health with six members drawn from the Ministry of Health, Ministry of Tourism and Environment and Ministry of Science and Technology. The NTF was mandated to conduct laboratory survey and inventory of stored wild poliovirus-containing materials in Zambia. In order to meet the country requirements for the certification of regions as being polio free, the purpose of the survey was to identify all laboratories storing WPV or potential infectious materials. The specific objectives were to provide documentation of the location of laboratories retaining WPV or potential infectious materials and to create and maintain a current list of laboratories to be notified about initiating the appropriate containment procedures one year after detection of the last WPV. Reported here is the process of Phase 1 of poliovirus containment in Zambia.

**METHODS**

A WHO generic questionnaire for poliovirus containment and modified by the NTF was sent to all public and private laboratories in Zambia. The questionnaire included both aspects of laboratory survey and inventory for storage of WPV or potential infectious materials.

These laboratories included those that had handled and sent stool specimens of children presenting with acute flaccid paralysis (AFP) to the National Polio Laboratory - Virology laboratory, University Teaching Hospital, Lusaka. All the data collected by questionnaire was entered into a computer database. Physical follow up visits by the NTF were made to some laboratories identified on the inventory list as potentially storing infectious materials for WPV and others were randomly picked.

**RESULTS**

A total of 170 laboratories were identified in Zambia, and 104 responded (61.1%) to the questionnaire. Of these respondents, 64.4% (67/104) were from the Ministry of Health, 3.8% (4/104) were from the Ministry of Agriculture and Cooperatives, 1% (1/104) Ministry of Defence, 2% (2/104) Ministry of Education, 28.8% (30/104) were private laboratories, (Table 1).

**Table 1: Total number of biomedical laboratories identified in Zambia**

Questionnaire	Type of laboratory No.	Percentage
Respondent Laboratories	Ministry of Health	67 64.4% (67/104)
	Ministry of Education	2 2.0% (2/104)
	Ministry of Defence	1 1.0% (1/104)
	Ministry of Agriculture	4 3.8% (4/104)
	Private laboratories	30 28.8% (30/104)
	Sub - Total	104 61.1% (104/170)
Non-Respondent Laboratories		66 38.9% (66/170)
Total Laboratories		170

**Table 2: Inventory of biomedical laboratories with WPV and potential infectious materials**

Respondent Laboratories	Number	Percentage
Laboratories possibly storing WPV and potential infectious materials	Visited by NTF	15 62.5%
	Pending Visit by NTF	9 37.5%
	Sub - Total	24 23% (24/104)
Visited Laboratories with confirmed WPV and potential infectious materials	1	6.7% (1/15)
Biomedical laboratories not storing any WPV or potential infectious materials	80	76.9% (80/104)
Total number of Respondent Laboratories	104	

Of all the laboratories that responded, 23% (24/104) were noted to be potentially having stored materials containing wild polioviruses (Table 2). Those physically inspected by the NTF were 62.5% and the rest 37.5% are pending to be inspected (Table 2). Of note is that only one laboratory, The National Polio Laboratory, Virology Laboratory at the University Teaching Hospital, Lusaka has stored both wild polioviruses and potential infectious materials in Zambia and these are securely stored in minus 70°C freezers under lock and key. In addition, this facility is a BSL-2 containment laboratory. These wild poliovirus stored materials in this laboratory date back to 1992.

**DISCUSSION**

Containment of infectious and potential infectious WPV materials after eradication is essential to minimise the risk for reintroducing WPV into poliomyelitis free communities. The staged containment approach begins with a national survey of all biomedical facilities, which alerts facilities to the need for containment, encourages reduction of WPV materials, and develops a national inventory of facilities holding such materials (Phase 1).<sup>1,2</sup>

In the near future, when WPV transmission is interrupted in the sub-region and indeed worldwide, laboratories

holding WPV will represent the only remaining repository of the virus<sup>6</sup> and maintaining the number of such facilities at a minimum and at an appropriate biosafety standard (laboratory containment) reduces the risk for a laboratory-associated reintroduction of WPV. Zambia has practically interrupted wild poliovirus transmission within its borders through high and sustained routine immunisation coverage with OPV given at birth, 6 weeks, 10 weeks and 14 weeks of age. Further, regular supplemental immunisation with OPV in children below 5 years has effectively interrupted the transmission of WPV. With the efficient AFP surveillance system in Zambia, nearly all AFP cases are identified and investigated.<sup>2</sup>

Of the 170 laboratories surveyed, 64.4% responded, table 1. The response was better than that reported in Australia during an inventory for WPV and potential infectious materials in that country. Only 22% of the laboratories provided a final inventory despite follow up phone calls.<sup>7</sup> Of the 24 laboratories identified as having potential infectious WPV only one facility, The National Polio Laboratory, Virology Laboratory at the University Teaching Hospital had stored both WPV infectious and potential infectious materials in the whole of Zambia (Table 2). All the stool specimens for AFP investigation from around Zambia are finally processed in this facility. There is paucity of data on the African continent or sub-region on the containment of WPV and potential infectious materials.

Enhanced biosafety containment and restricted access to the stored materials containing wild poliovirus at the Virology Laboratory, University Teaching Hospital, Lusaka, is a major step in the eradication of poliomyelitis in Zambia.<sup>8</sup> Appropriate biosafety measures are crucial for the prevention of poliovirus infection of laboratory workers and subsequent transmission to the community. In India, between 2000 and 2003, MEF-1 laboratory reference strain of poliovirus type 2 was isolated in ten children with paralytic poliomyelitis.<sup>9</sup> The origin of the virus was some laboratory not identified.<sup>9</sup> This episode further highlights the urgent need for stringent containment of wild poliovirus and potential infectious materials in laboratories to prevent such incidences. Containment of such materials will become more crucial and probably more challenging in the post oral polio vaccination cessation era when there will be a large pool of unimmunised children in the community. This unique and impressive momentum set by the Ministry of Health through the NTF should be maintained to monitor and supervise the containment of WPV and potential infectious materials is commendable. All the

documentation will be readily available to the Africa Region Certification Committee of the World Health Organisation when declaring the sub-region polio free and not just Zambia.

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