



Ministerio da Saúde de Moçambique
Direcção Nacional de Saúde Pública
Departamento das Doenças Tropicais Negligenciadas



Liverpool School of Tropical Medicine

Praziquantel coverage verification survey

SUMMARY

Mozambique - July 2015



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ACRONYMS

ALB	Albendazole
DFID	Department for International Development (UK)
DR	Decision rule
ICOSA	Integrated Control of Schistosomiasis and soil transmitted helminths in sub-Saharan Africa
IVM	Ivermectin
LF	Lymphatic filariasis
LQAS	Lot quality assurance sampling
MDA	Mass drug administration
MISAU	Ministry of Health
PZQ	Praziquantel
SCH	Schistosomiasis
STH	Soil-transmitted helminthes
WHO	World Health Organization



EXECUTIVE SUMMARY

The Republic of Mozambique has been conducting control and elimination activities for lymphatic filariasis (LF), schistosomiasis (SCH) and soil transmitted helminths (STH) since 2009. Mozambique is endemic in all its 128 districts both for SCH and STH and in 104 districts for LF. The elimination program using mass administration of medication has been gradually expanding and now includes all districts in the country. In June 2015, an MDA targeted 10.5 million people treated with praziquantel and albendazole in 97 districts.

Although routine campaign data and sentinel site data should suffice to adequately judge coverage, there are some doubts about the quality and consistency of some of the data. In addition, during the latter stages of disease elimination WHO recommends the performance of regular surveys to confirm the coverage. This report outlines the process and results of the first pilot praziquantel coverage survey carried out in 16 districts in the four Northern provinces in July and August 2015.

Although WHO standard protocols describe cluster survey methodology, the Neglected Tropical Disease Program together with Liverpool School of Tropical Medicine decided to pilot Lot Quality Assurance Sampling for the survey due to its speed, small sample size and ability to provide information down to the district level. In addition, electronic data collection and transmission using smartphones was introduced in some areas to gain experience as well as to speed data collection and analysis and improve data quality.

The sixteen districts were distributed four in Nampula, five each in Cabo Delgado and Zambezia, and three in Niassa. Three of the sixteen districts were further subdivided as follows: Nampula city was divided into four survey areas, Nampula district (Rapale) was divided into two, and Lichinga district was divided into two districts. This was done in order to improve the statistical analysis of the results. In each district and subdivision, a sample size of 26 households were to be visited in order to allow for provincial coverage estimates with confidence intervals of eight percentage points or less, and classification of districts as to whether they achieved the 75% coverage target with an error of 0.1 or less.

The actual sample included caretakers of 578 children five to fourteen years of age randomly selected from households who in turn were chosen at random in their respective districts. Supervisors were drawn from Ministry of Health Neglected Tropical Disease team members as well as provincial NTD focal points. Enumerators were all district NTD focal points. Enumerators collected data either on smartphones using ODK software or on paper questionnaires. Supervisors reviewed the data and entered any paper questionnaires into their own phones, and then data were transmitted to a Google cloud server and then downloaded for analysis.

The analysis showed that the sample was evenly divided by gender, with the age distribution slightly skewed toward the younger age group. A total of 72% of all caretakers were either mothers or fathers. Overall praziquantel coverage was 82% (95% confidence interval $\pm 3\%$), with the highest coverage found in Cabo Delgado (89% $\pm 5\%$), followed by Niassa (84% $\pm 7\%$), Zambezia (81% $\pm 7\%$), Nampula rural area (79% $\pm 8\%$) and Nampula city (73% $\pm 8\%$). All were above the 75% coverage target to within the 95% confidence interval.



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Although there was no difference in praziquantel coverage by gender, school enrollment significantly affected coverage. Overall, 85% ($\pm 3\%$) of children were enrolled in school. A total of 84% ($\pm 3\%$) of these had taken praziquantel, but only 67% ($\pm 10\%$) of children not enrolled had. The most common reason given for not taking praziquantel was that the caretaker was not home on the day of the distribution, and the second most common was that the child was not in school that day.

Most of the distribution was done in schools (79%) followed by health centers (11%). However, there were significant differences between provinces, with Niassa showing the most variety in locations (only 44% in schools) and Cabo Delgado the least (95% in schools). This is perhaps the reason why Niassa, in spite of having the lowest school enrollment (62%), had the second highest praziquantel coverage among the four provinces.

Adverse effects were reported by 15% of caretakers, the most common of these being dizziness, abdominal pain and fever. But adverse effects were named by less than one percent of caretakers as the reason a child did not take praziquantel. Only 102 of the 578 caretakers (18%) correctly named blood in the urine as the reason to take praziquantel.

Classification of districts as to whether they had achieved the 75% coverage target was possible using LQAS principles. All districts passed for this level of coverage, but Nampula city was the closest to being marginal. Specifically, Muhala neighborhood was seen to possibly require more attention even though it was classified as having achieved the 75% coverage target. Comparison of data with that generated by the MDA campaign teams was generally similar, with the survey coverage consistently six to seven percentage points below the MDA estimates. However, province by province and district by district relative rankings were almost identical.

Overall, the LQAS methodology proved to be cost effective and rapid. The draft report was available only three weeks after the start of enumerator training, and results are meaningful for regional, provincial and district levels. Likewise, electronic data collection performed well in the field and warrants expansion. The enumerators learned quickly, and the data quality was very good.

The results of the survey imply that Nampula should be watched carefully in order to maintain coverage. Increasing the variety of distribution points beyond schools may lead to improved coverage, especially among children not enrolled in school. The LQAS methodology and electronic data collection proved successful overall. In future surveys, more attention should be paid to the heavy burden LQAS imposes on logistics, however.



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SUMÁRIO EXECUTIVO

Desde 2009 a República de Moçambique tem realizado atividades de controlo e eliminação de filaríase linfática, esquistossomose e helmintíases transmitidas por terra. A esquistossomose e helmintíases são endêmicas em todos os 128 distritos do país, e a filaríase em 104 distritos. O programa de eliminação através da administração massiva de medicamentos tem-se expandido paulatinamente até incluir todos os distritos do país. A administração massiva de Junho 2005 abrangeu 10,5 milhões de pessoas tratadas com praziquantel e albendazol em 97 distritos.

Embora os dados das campanhas e dos sítios sentinela juntos deveriam ser suficientes para estimar a cobertura, há algumas dúvidas sobre a qualidade e consistência de alguns destes dados. Além disto, a OMS recomenda que, durante as últimas fases de eliminação, deve-se realizar inquéritos periódicos para confirmar a cobertura. Este relatório descreve o processo e os resultados do primeiro inquérito piloto de cobertura de praziquantel realizado em 16 distritos das quatro províncias da região norte em Julho e Agosto de 2015.

Os protocolos da OMS descrevem a metodologia de amostragem por conglomerados como padrão para inquéritos de cobertura. Porém, o Programa de Doenças Tropicais Negligenciadas e a Escola de Medicina Tropical de Liverpool tomaram a decisão de utilizar da técnica de amostragem “Lot Quality Assurance Sampling” para este inquérito devido à sua rapidez, amostra pequena, e habilidade de providenciar informação até o nível de distrito. Além disto, a recolha e transmissão de dados usando telefones do tipo Android foi introduzida em algumas áreas para acelerar a recolha e análise de dados e garantir a qualidade dos mesmos.

A distribuição dos 16 distritos foi o seguinte: 4 em Nampula, 5 cada um em Cabo Delgado Zambézia, e 3 em Niassa. Três dos 16 distritos foram subdivididos: Cidade Nampula foi subdividido em 4 áreas de pesquisa, Distrito Nampula (Rapale) em dois, e Distrito Lichinga em 2. Isto fez-se para melhorar a análise estatística seguindo os princípios da amostragem LQAS para permitir o cálculo de estimativas de cobertura provincial com intervalos de confiança de oito pontos percentuais ou menos, e também a classificação de cada distrito de ter ou não ter alcançado o alvo de 75% de cobertura com uma margem de erro alfa e beta de 0.1 ou menos.

A amostra incluiu responsáveis de 578 crianças de cinco a catorze anos aleatoriamente selecionadas de famílias que, por sua vez, foram aleatoriamente selecionadas nos seus respetivos distritos. Membros da equipa do Programa de Doenças Tropicais Negligenciadas do Ministério da Saúde junto com pontos focais provinciais serviram como supervisores, enquanto pontos focais distritais serviram como enumeradores no inquérito. Os enumeradores recolheram os dados ou nos telefones usando software “ODK” ou em formulários em papel. Os supervisores revisaram os dados, digitaram os que estavam em papel para os seus próprios telefones e transmitiram os dados para um servidor Google para ser baixados para análise posterior.

A análise mostrou uma divisão igual por gênero, mas a distribuição etária ligeiramente favoreceu a faixa de crianças de 5-9 anos. Dos responsáveis, 72% foram mães ou pais. A cobertura total de praziquantel foi de 82% (intervalo de confiança 95% de $\pm 3\%$), com a cobertura mais alta em Cabo Delgado ($89\% \pm 5\%$), seguido por Niassa ($84\% \pm 7\%$), Zambézia ($81\% \pm 7\%$), Nampula rural ($79\% \pm 8\%$), e Nampula Cidade ($73\% \pm 8\%$). Todas as coberturas estavam acima da cobertura alvo de 75% dentro do intervalo de confiança.



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Embora o gênero da criança não teve efeito na cobertura de praziquantel, a matrícula escolar afetou-a significativamente. Um total de 85% ($\pm 3\%$) de crianças estavam matriculadas na escola. Destas, 84% ($\pm 3\%$) tomaram praziquantel enquanto apenas 67% ($\pm 10\%$) das crianças não matriculadas tomaram. A razão mais comum por não tomar o medicamento foi a ausência do responsável no dia da distribuição, seguido pela ausência da criança da escola naquele dia.

Na maioria dos casos a distribuição foi realizada em escolas (79%) seguido pelos centros de saúde (11%). Porém, encontraram-se diferenças significativas entre as províncias. Por exemplo, em Niassa apenas 44% da distribuição ocorreu nas escolas enquanto em Cabo Delgado foi de 95%. Isto é uma possível explicação pelo facto de que, embora Niassa tinha a taxa de matrícula escolar mais baixa (62%), não foi a província com a cobertura de praziquantel mais baixa das quatro províncias.

Os responsáveis mencionaram efeitos adversos em 15% dos casos, dos quais os mais comuns foram tontura/vertigem, dor abdominal e febre. Contudo, menos de um por cento dos responsáveis citaram efeitos adversos como motivo por não tomar o praziquantel durante a distribuição. Apenas 102 dos 578 responsáveis (18%) puderam nomear a aparência de sangue na urina como motivo para tomar o praziquantel.

Usando a técnica de LQAS, é possível classificar os distritos entre os que alcançaram a meta de cobertura de 75% e os que não alcançaram. Todos os distritos passaram para este nível de cobertura, embora Nampula Cidade ficou mais perto do limiar que os outros. Mais especificamente, o Bairro de Muhala deveria receber mais atenção para garantir que mantenha o nível de cobertura. A comparação dos dados do inquérito com aqueles produzidos durante as campanhas de distribuição mostrou que os dois são similares, embora a cobertura do inquérito foi consistentemente entre seis e sete pontos percentuais abaixo da cobertura estimada nas campanhas. Esta relação é típica quando comparam-se dados de campanhas e inquéritos. A comparação dos “rankings” (posições relativas) província por província e distrito por distrito são praticamente idênticos.

No geral, a metodologia LQAS comprovou-se a ser custo-efetiva e rápida. O relatório provisório ficou disponível apenas três semanas após o início do treinamento dos inquiridores, e os resultados são úteis aos níveis regional, provincial e distrital. Da mesma forma, a recolha de dados usando meios eletrônicos foi útil no campo e merece expansão em futuros inquéritos. Os inquiridores e supervisores aprenderam a sua utilização rapidamente, e a qualidade dos dados foi muito boa.

Os resultados do inquérito implicam que deve-se prestar atenção à provincial de Nampula para manter a cobertura adequada. Uma estratégia que deverá ser investigada é o aumento na variedade de locais de distribuição de medicamentos fora da utilização exclusiva de escolas. Isto deverá ter um efeito positivo na cobertura, especialmente com respeito às crianças não matriculadas na escola. A metodologia LQAS e a recolha de dados com meios eletrônicos tiveram sucesso e serão úteis em futuros inquéritos. Porém, deve-se prestar muita atenção nas exigências desta metodologia na logística.



SUMMARY OF FINDINGS

School enrollment and attendance on the day of the survey

The following table illustrates the proportion of children sampled who were enrolled in school by province as well as the proportion of children actually in school on the day of the survey.

Table 1 School enrollment and attendance by province

Province	Enrolled in school? ±95%CI	In school today? Number		Total
		As % of enrolled ±95%CI	As % of all children ±95%CI	
Cabo Delgado	122	117		132
	92%±5%	96%±5%	89%±5%	100%
Nampula city	94	66		107
	88%±6%	70%±7%	62%±9%	100%
Nampula rural	93	67		105
	89%±6%	72%±6%	64%±9%	100%
Niassa	64	46		104
	62%±9%	72%±12%	44%±10%	100%
Zambezia	120	101		130
	92%±5%	84%±6%	78%±7%	100%
Total	493	397		578
	85%±3%	81%±3%	69%±4%	100%

As can be seen in the above table, Niassa, with 62% of children sampled enrolled in school, was significantly lower than the national average. The second school-related question that was asked was “is the child in school today” (or, in the case that the survey was carried out on a weekend, “last Friday”). For this question, Cabo Delgado performed significantly higher than the national average, with 96% of enrolled children also attending school the day of the survey.

PROVINCIAL COVERAGE RESULTS

The key indicator for the coverage survey is the proportion of children 5-14 years of age who took praziquantel in the June 2015 MDA.



Table 2 Coverage of praziquantel by province

Province	Took Praziquantel	Total	Unweighted coverage	Population – weighted coverage
Cabo Delgado	120	132	91%±5%	89%±5%
Nampula city	78	107	73%±8%	73%±8%
Nampula rural	84	105	80%±8%	79%±8%
Niassa	88	104	85%±7%	84%±7%
Zambezia	103	130	79%±7%	81%±7%
Total Regional	473	578	82%±3%	80%±3%

Table 2 shows that no province fell below the 75% coverage target if one takes into account the 95% confidence intervals. It should be noted that all of the estimates of praziquantel coverage are conservative, as the 21 caretakers who responded “don’t know” to whether the child received the drug were counted as “no” in the tabulation. Cabo Delgado had the highest coverage for praziquantel, and Nampula city had the lowest. However, it should be noted that the proportion of “don’t know” responses for this question was 1.5% or less for Cabo Delgado, Zambezia and Niassa, it was 8.4% for Nampula City and 7.6% for Nampula Rural. Many of these may have received praziquantel unbeknownst to the caretaker that was interviewed.

The small difference in population-weighted vs. unweighted coverage is typical of that found in this type of survey. Although a small difference may be apparent, population-weighted results rarely change the overall conclusions for surveys compared with unweighted results as long as the survey and sampling are designed carefully so that different areas surveyed do not have wildly different population sizes.

SUMMARY OF DISCUSSION

Comparison between coverage estimates from the survey and from the June 2015 MDA show similar trends:

Table 3 Comparison of coverage between MDA and Coverage Survey

Province	Survey estimated coverage	MDA reported coverage
Cabo Delgado	91%	99.5%
Nampula city	73%	83.1%
Nampula rural	(mean = 76%) 80%	
Niassa	85%	92.0%
Zambezia	79%	85.8%
Total North	82%	85.2%

Although the survey estimate of coverage was somewhat lower than the MDA estimate, this was expected: it is almost always the case that coverage estimates from campaigns are higher than those of surveys for any activity. However, there is surprisingly perfect agreement in the ranking of the provinces by coverage (1. Cabo Delgado; 2. Niassa; 3. Zambezia; 4. Nampula). In addition, by either measure the coverage is above the 75% target (within the confidence intervals of the coverage survey). The same relationship of ranking applies to the districts within each province as well in that it is almost the same as the results from the campaign.



Picture 1. LQAS training session in Nampula.



Picture 2. Interviews during survey in Nampula.