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# Factors Determining Non-compliance to Mass Drug Administration for Lymphatic Filariasis Elimination in Endemic Districts of Nepal

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## ABSTRACT

**Background:** Mass drug administration (MDA) has been implemented in Nepal since 2003 for elimination of Lymphatic Filariasis (LF). The objective of this study was to explore the factors that determine the non-compliance to MDA for Lymphatic Filariasis elimination in endemic districts of Nepal.

**Methods:** A cross-sectional descriptive study was carried out in three endemic districts namely Dhading, Kapilvastu and Kailali. A total of 900 people were interviewed with structured questionnaire.

**Results:** The result shows that the respondents who knew the DEC contains Albendazole (84.9% vs 42.5%, P<0.001, Adjusted OR=2.89(1.946-4.29) at 95% CI), who were aware of MDA campaign (78.2% vs 33.8% P<0.001, Adjusted OR=2.87(1.73-4.74) at 95% CI), who were visited by health workers at their home during MDA campaign (75.9% vs 24.1% P<0.001, Adjusted OR=4.85(2.448-9.594) at 95% CI) had significantly higher compliance. The respondents who had knowledge of side effects during MDA campaign had lower prevalence of non-compliance as compared who did not have (9.4% vs 33.2%, P<0.001).

**Conclusions:** Advanced age, primary or below education, ever married, inadequate knowledge on drug, inadequate awareness on MDA, no home visit by health workers during MDA, no belief on MDA drugs were significantly associated with higher non-compliance to MDA. In future, MDA program should focus on awareness campaigns related to composition of drugs, side effects of drugs and compulsory home visit during the campaign.

**Keywords:** Lymphatic Filariasis; Mass drug administration; Non-compliance, Nepal

## INTRODUCTION

Lymphatic Filariasis is a parasitic disease endemic in 83 countries affecting 120 million people of Asia, Africa, the Western Pacific and some parts of the Americas. It is responsible for 40 millions chronic disability and covert lymphatic changes globally.[1]

In 2000, the Global Programme to Eliminate Lymphatic Filariasis (GPELF) was created with the aim of eliminating LF by 2020. This programme is focused on interrupting the transmission of the parasite by annual, community-wide mass drug administration of single dose DEC (Diethyl carbamazine) and management of chronic manifestations of the disease.[2,3]

The Government of Nepal initiated MDA in 2003. By 2011, the program expanded to 46 districts.[4] Amidst of low literacy, ignorance and myths about disease and side effects of DEC among rural and urban population in Nepal,[5] not all who took DEC from MDA campaign might have swallowed it completely. The present study therefore explored the factors determining non-compliance of MDA in selected districts of Nepal.

## METHODS

This study is a part of broad cross-sectional descriptive study carried out in three of the 60 LF endemic districts to explore parasitological and socio-cultural aspects of

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LF in Nepal. This study was conducted for four months between July and December, 2013.The selected districts included Dhading, Kapilvastu and Kailali. Dhading district covers an area of 1,926 km$^2$, giving habitation to 336,067 people in 2011. Kapilvastu district with an area of 1,738 km$^2$ has inhabitants of 571,936 in 2011. Kailali district occupies an area of 3,235 km$^2$ and is inhabited by 775,709 people in 2011.[6]

From the three selected districts, sentinel surveillance sites were randomly selected. The population within sentinel surveillance sites constituted the sampling frame. Taking prevalence as national wide MDA coverage of 68.8% in 2011,[4] 5% allowable error and 20% non-response rate, we obtained final sample size of 828. However, we recruited 900 individuals, approximately 300 from each district for convenience. Six questionnaires were removed from analysis because of incompleteness. Thus, final analysis of 894 samples was performed. For the purpose of data collection, a central point was identified in each site, and the first house was selected randomly. Households were selected purposively from consecutive houses having the nearest entrance until the required sample size was met.

The head of the household present was selected at the time of survey for interview. Pretested semi-structured questionnaires were used for interview. Data were collected on knowledge of MDA, side effects following DEC, and awareness of LF, including coverage and compliance of MDA.

This study obtained ethical approval from Institutional Review Board (IRB) of Institute of Medicine, Tribhuvan University, Nepal. Informed consent form approved by the IRB was read by the interviewers. The IRB decided that the study presented no harm to subjects and involved no procedures for which written consent was normally required. Therefore, we obtained verbal consent from each respondent before taking the interview.

We defined non-compliant as an adult member from the selected households, who either did not receive the drugs or received the drug but did not swallow it. Similarly, compliant was defined as an adult member from the selected households who received the drug and reported to swallow it. So, the compliance of MDA in this study is the number of people who swallowed the drugs completely.

The explanatory variables used in this study were based on the variables used in earlier study.[7] Ethnicity was classified as *Brahmin/Chhetri, Newar, Janajati/adhibasi, Dalit, Madhesi* groups based on *Manusmriti*, a traditional Hindu scripture and further divided into advantaged and disadvantaged based on the same.[8] Socioeconomic status was classified as poor, medium and rich based Household Budget Survey.[9]

Data was coded, cleaned and entered in the same day of data collection. Epi Data 3.1 was used in data entry. Data was exported to SPSS 20.0 for analysis. Association of outcome and explanatory variables of interest was first evaluated using Chi-square test. The variables significant in chi-square test ($P \leq 0.05$) as well as other prior predictors were further analyzed using multivariate logistic regression. Interaction of variables was explored using backward elimination.

## RESULTS

Proportion of respondents included: Dhading (36.8%), Kapilvastu (33.7%) and Kailali (29.8%). Majority of the respondents were >40 years of age and male (61.0%), Hindu (87.8%) and employed in agriculture (49.6%). More than one third of respondents were illiterate (36.4%) and had secondary or above level of education (36.7%). Six of the 10 respondents (63.5%) were married. Ethnic wise, the respondents comprised of *Janajati/Adhibasi* (26.7%), *Brahmin* (20.1%), *Madheshi* (18.7%), *Chhetri* (10.5%) and *Dalit* (10.5%) (Table 1). 28.4% of the respondents were non-compliant. The prevelance of compliance are 314(95.4%), 158(52.5%) and 168(63.6%) in Dhading, Kapilbastu and Kailali respectively.

**Table 1: Demographic characteristics of compliant and non-compliant**

| Variables | Non Compliance(n=254) | Compliance (n=640) | P value |
|---|---|---|---|
| **Study districts** | | | P<0.001 |
| Dhading | 15(4.6%) | 314(95.4%) | |
| Kapilbastu | 143(47.5%) | 158(52.5%) | |
| Kailali | 96(36.4%) | 168(63.6%) | |
| **Age** | | | P=0.002 |
| <20 years | 61(20.9%) | 231(79.1%) | |
| 20-40 years | 83(31.3%) | 182(68.7%) | |
| >40 years | 110(32.6%) | 227(67.4%) | |

| | | | |
|---|---|---|---|
| **Sex** | | | P=0.743 |
| Male | 157(28.8%) | 388(71.2%) | |
| Female | 97(27.8%) | 252(72.2%) | |
| **Educational status** | | | P<0.001 |
| Illiterate | 133(40.9%) | 192(59.1%) | |
| Primary or Below | 36(14.9%) | 205(85.1%) | |
| Secondary or above | 85(25.9%) | 243(74.1%) | |
| **Marital status** | | | P=0.440 |
| Ever married | 179(29.2%) | 434(70.8%) | |
| Unmarried | 75(26.7%) | 206(73.3%0 | |
| **Ethnicity** | | | P<0.001 |
| Advantaged | 58(19.1%) | 245(80.9%) | |
| Disadvantaged | 196(33.2%) | 395(66.8%) | |
| **Occupation** | | | P=0.018 |
| Employed | 210(30.3%) | 482(69.7%) | |
| Unemployed | 44(21.8%) | 158(78.2%) | |
| **Socioeconomic status** | | | P=0.022 |
| Poor | 71(22.8%) | 241(77.2%) | |
| Medium | 110(31.0%) | 245(69.0%) | |
| Rich | 73(32.2%) | 154(67.8%) | |

The findings from the bivariate analysis are shown in Table 1 and 2. The result shows that the respondents who know the DEC contains Albendazole had significantly higher compliance as compared with the respondents who don't know (84.9% vs 42.5%, P<0.001, Adjusted OR=2.89(1.946-4.29) at 95% CI). Similarly, the result shows that the respondents who were aware of MDA campaign had significantly higher prevalence of compliance as compared with the respondents who were unaware (78.2% vs 33.8% P<0.001, Adjusted OR=2.87(1.73-4.74) at 95% CI). The respondents who had knowledge of side effects during MDA campaign had lower prevalence of non-compliance as compared with the respondents who did not have (9.4% vs 33.2%, P<0.001). Similarly, the result shows that the respondents who were visited by health workers at their home during MDA campaign had significantly higher compliance as compared with the respondents who were not (75.9% vs 24.1% P<0.001, Adjusted OR=4.85(2.448-9.594) at 95% CI).

**Table 2: MDA related characteristics of compliant and non-compliant**

| Variables | Non Compliance (n=254) | Compliance (n=640) | P value |
|---|---|---|---|
| **Heard about Lymphatic Filariasis** | | | P=0.013 |
| Yes | 205(26.9%) | 558(73.1%) | |
| No | 49(37.4%) | 82(62.6%) | |
| **Aware of MDA campaign** | | | P<0.001 |
| Aware | 166(21.8%) | 595(78.2%) | |
| Unaware | 88(66.2%) | 45(33.8%) | |
| **MDA also includes albendazole** | | | P<0.001 |
| Know | 93(15.1%) | 521(84.9%) | |
| Don't Know | 161(57.5%) | 119(42.5%) | |
| **Trust that MDA campaign provides quality DEC** | | | P<0.001 |
| Yes | 163(49.5%) | 166(50.5%) | |
| No | 91(16.1%) | 474(83.9%) | |
| **Knowledge of side effects** | | | P<0.001 |

| | | | |
|---|---|---|---|
| Yes | 17(9.4%) | 164(90.6%) | |
| No | 237(33.2%) | 476(66.8%) | |
| **Health workers gave adequate advice on DEC during MDA** | | | P<0.001 |
| Yes | 57(11.7%) | 432(88.3%) | |
| No | 197(48.6%) | 208(51.4%) | |
| **At MDA campaign, health worker arrived at home** | | | P<0.001 |
| Arrived | 88(34.6%) | 486(75.9%) | |
| Didn't arrive | 166(65.4%) | 154(24.1%) | |
| **Belief that having DEC benefits community** | | | P<0.001 |
| Yes | 153(54.4%) | 128(45.6%) | |
| No | 101(16.5%) | 512(83.5%) | |
| **Committed to take DEC next year** | | | P<0.001 |
| Yes | 208(25.3%) | 615(74.7%) | |
| No | 46(64.8%0 | 25(35.2%) | |

In multivariate analysis, Respondents of >40 years of age (OR 4.15(1.966-8.760)), primary or below level of education (OR 1.74(1.009-2.988)) and being ever married (OR 2.46(1.313-4.597)) predicated higher likelihood of non-compliance.

**Table 3: Factors associated with non-compliance**

| Variables | Unadjusted odds ratio 95% CI | Adjusted odds ratio 95% CI |
|---|---|---|
| **Age** | p=0.002 | P<0.001 |
| >40 years | 1.84(1.277-2.637) | 4.15(1.966-8.760) |
| 20-40 years | 1.06(0.752-1.501) | 1.27(0.790-2.044) |
| <20 years | 1 | 1 |
| **Educational status** | P=0.000 | P=0.003 |
| Secondary or above | 1.98(1.422-2.759) | 0.67(0.386-1.147) |
| Primary or below | 3.95(2.598-5.989) | 1.74(1.009-2.988) |
| Illiterate | 1 | 1 |
| **Marital status** | P=0.440 | P=0.005 |
| Ever married | 0.88 (0.643-1.211) | 2.46(1.313-4.597) |
| Unmarried | 1 | 1 |
| **Aware of MDA campaign** | P<0.001 | P<0.001 |
| Unaware | 7.01(4.707-10.439) | 2.86(1.728-4.740) |
| Aware | 1 | 1 |
| **MDA also includes albendazole** | P<0.001 | P<0.001 |
| Don't know | 7.58(5.483-10.477) | 2.89(1.946-4.293) |
| Know | 1 | 1 |
| **Trust on MDA campaign provides quality DEC** | P=0.000 | P<0.001 |
| No | 5.12(3.746-6.984) | 2.32(1.570-3.416) |
| Yes | 1 | 1 |
| **At MDA campaign, health worker arrived at home** | | |
| Arrived | 5.95 (4.34-8.16) | 4.85 (2.448-9.594) |
| Not arrived | 1 | 1 |
| **Belief that DEC benefits community** | P=0.000 | P<0.001 |
| No | 6.06(4.412-8.322) | 2.87(1.902-4.323) |
| Yes | 1 | 1 |

## DISCUSSION

The non-compliance of MDA was associated with study location, age, educational status, marital status and knowledge, attitude variables in further analysis. Slightly less than one in three respondents was non-compliant to MDA in this study.[5] The non-compliance to MDA helps continuing infection of microfilariae in the community.[10] Maintaining a constant MDA coverage 80-90% and continuing compliance is necessary for achieving LF elimination in few rounds of MDA.[11] For achievement of elimination status, the current efforts in increasing coverage and compliance of MDA are inadequate. Clearly, for elimination of LF, coverage and compliance of MDA has to be improved. So, having known the factors that determine non-compliance of MDA might help policy makers and program manager to improve LF elimination status with planned interventions.

It is concluded that respondents who were not aware of DEC includes albendazole were more likely to be non-compliant. This corresponds to people with some level of awareness or information about worm infestation might have been interested to have DEC. This makes them perceive positive to MDA campaign. People did not believe the rumors related to MDA drugs due to this knowledge as well. In favor of this finding, a study in Haiti showed that the people who did not know that the pills contained albendazole were more likely to be non-compliant.[7]

The result shows that the respondents who were aware of MDA campaign had significantly higher compliance as compared with the respondents who were unaware. The respondents who had knowledge of side effects during MDA campaign had lower prevalence of non-compliance as compared to those who did not have. It is found that respondents who have primary or below education were more likely to be non-compliant. A study found that individuals who were using personal protection to mosquito were non-compliant.[14] Personal protection measure application might be encouraged by education and awareness. A study done in Haiti showed education as a significant predictor of non-compliance.[7] Another study from India did not find association of education with compliance.[12] People who have completed primary education and received basic information about LF might have been subjected to more rumors about DEC than other people. However, having received MDA related education regarding side effects, drugs, and objectives was found to be significant predictor of compliance in another study.[13]

The respondents who had side effects during MDA campaign had lower prevalence of non-compliance as compared with the respondents who did not have. Side effects are related to quality of drugs according to respondents. It is found that the respondents who did not believe on quality of MDA drugs were more likely to be non-compliant. People's concern regarding the pills distributed during the MDA is a reason for non-compliance.[19] Large numbers of pills to be swallowed at a time, size and taste of the pills might have reduced compliance to MDA. A Study in Haiti reported that bad pills were distributed, while other studies in India reported loose and disintegrated tablets were distributed.[10,15,16] Because of earlier experiences of people with low quality drugs10 and fear of side effects, it's very difficult for the people to believe that DEC will not harm them.

The result shows that the respondents who were visited by health workers at their home during MDA campaign had significantly higher compliance as compared with the respondents who were not visited. Respondents might have perceived that the importance of MDA and DEC regarding information due to health worker visit to their home. This study found that respondents who didn't believe on taking DEC will positively benefit their society were more likely to be non-compliant. It is possible that people, who didn't perceive any benefit of having DEC, did not consume DEC. The Health Belief Model describes that perception of benefit increases the utilization of health services.[17] Perceived benefit has been frequently reported as the contributor to increased utilization of health services in earlier studies.[18,19] Though people believe that having DEC is good for them, they are not taking might be due to fear of side effects or being away from home during the MDA. The current study didn't report association of socioeconomic status with noncompliance while earlier study reported lower socioeconomic status is associated with lower compliance to health services and were less likely to have a referral.[20] Another study reported that higher percentage of people of low-income households had higher intention to consume DEC compared to people from high-income households.[14]

Awareness activities during the MDA campaign need to assure people that government is using quality drugs. This can be done with the mobilization of female community health volunteers, social leaders such as teachers, health workers, social workers and politicians.

This study explored the factors affecting non-compliance of MDA in selected districts of Nepal. In the light of government's effort to eliminate the disease by 2020, the study findings can be useful for policy makers and program planners to increase the MDA compliance. This study was carried out in three locations to represent different regions and ethnic groups in Nepal. Having used a cross sectional design, the study might have

been suffered from recall bias[21] while assessing the compliance of MDA. Further research should focus on socio-economic differentials of MDA compliance in Nepal.

## CONCLUSIONS

Advanced age, primary or below education, ever married, inadequate knowledge on drug contains albendazole in MDA, unknown about side effects of drugs, inadequate awareness on MDA, no home visit by health workers during MDA, no belief on MDA drugs significantly predicted higher non-compliance to MDA. Future MDA campaign should target people with primary education and >40 years of age and married people. MDA program should focus on awareness campaigns related to composition of drugs, side effects of drugs and compulsory home visit during the campaign.

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