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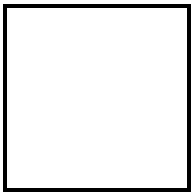

Burden of Kala-azar on the Local Health System in Danusha and Mahottari Districts of Nepal

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ABSTRACT

This paper is based on a study which assesses the burden of Kala-azar on the Local Health System in the Mahottari and Danusha Districts of Nepal. The Local Health System in those districts are represented by the purposive selection of Janakpur Zonal Hospital and Mahottari District Hospital since those institutions have the sole facility in their respective districts for diagnosis and treatment of Kala-azar. The objective of the study was to determine the absolute burden of Kala-azar on the Local Health System and its burden relative to other diseases such as encephalitis, malaria and tuberculosis. The materials were obtained through both medical records and structured questionnaires with key personnel in those institutions. The results indicate that there is a significant burden of Kala-azar on the Local Health System whose direct cost can be seen by the total cost to doctors and the nurse staff as well as the indirect cost through bed occupancy. In addition, analysis of data suggest that comparison for Kala-azar, in relation to other diseases, is tricky since its definition of the Local Health System is much narrower vis-à-vis other diseases.

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INTRODUCTION

Kala-azar (KA; visceral leishmaniasis), caused by *Leishmaia donovani*, is a disease which is debilitating and fatal[1]. Because of its impact on society, there have been many studies which assess its direct and indirect impact on households. However, there have been limited studies which assess the burden of KA on the Local Health System (LHS). This aspect is important since burdening the LHS can reduce quality of treatment which may exacerbate the impact of KA to affected households. In an extreme case, the effect of KA may even spill-over to other areas, burdening adjoining LHS with eventual disastrous consequences to overall economic development[2].

This study is the first such study whose main objective is to assess the absolute burden of KA to the Nepalese LHS. Further, this study attempts to assess the relative burden of KA to the Nepalese LHS vis-à-vis other diseases such as encephalitis, malaria and tuberculosis. Of the 75 districts in Nepal, only eleven districts are classified as KA prone[3]. For this study, two of those eleven districts, namely Dhanusha and Mohattari Districts (now called DMD for short), were purposively selected due to relatively better data record systems there.

Further, the LHS in DMD warrants some description. The LHS of DMD include Janakpur Zonal Hospital (JZH), in the Dhanusha District, Mahottari District Hospital (MDH) in the Mahottari District, as well as eight primary health care centers, fifteen health posts and one hundred fifty four sub-health posts spread throughout DMD. However, the latter three types institutions play no part in diagnosis and treatment of KA; if KA is suspected then those individuals are referred either to JZH or to MDH. Due to this, the study solely focused on those two institutions, namely JZH and MDH, for assessing the burden of KA to the LHS in DMD.

The paper elaborates the finding of that study and proceeds as follows: the next section discusses the materials and methods, the third section provides results while the last section ends by giving discussion.

MATERIALS AND METHODS

As mentioned above, the thrust of the study was to measure the burden of KA on LHS in DMD. The materials used were data mainly from primary and secondary sources. For LHS, the burden can be categorized as both direct and indirect.[3] The direct burden on LHS is on treatment of diseases which, for KA, is undergoing a regime of fourteen to sixteen Fungizone (Amphotericin - B). However, the cost of KA treatment, in Nepal, is presently being borne by the Nepalese Government. It should be mentioned that those patients who are admitted for treatment are identified KA patients who had been previously tested through examination of Leishmania-Donovan (L.D.) bodies from bone marrow test and, where available, Direct Agglutination Test (DAT). The direct burden on

LHS can thus be quantified mainly through the total cost for the doctors and the nursing staff during the course of a KA admission. The indirect burden of KA on LHS may be more difficult to quantify due to the difficulty of obtaining reliable data. For this study, the indirect burden of KA on LHS is measured by percentage of hospital beds used for treatment of KA.

To capture the information mentioned above, both medical records of JZH and MDH were obtained as well as structured questionnaires were delivered. It should be noted that the structured questionnaires had been pre-tested two months prior to the actual field visit and had been refined based upon those results before arriving at the final version. The structured questionnaires were given to the Medical Supervisor and other relevant medical officers in JZH and MDH by the study steam. The product of the field visit are provided in the next section.

RESULTS

The medical records of JZH and MDH are presented below to give a flavor of the types of admission in JZH and MDH. It should be noted in the first and second Table, information are presented for six leading causes of hospital admission. This path was chosen since all the categories of patients could not be included due partly to inadequate data on diagnosis. It should be further noted that the study period covers five months in the Nepalese calendar from mid-April to mid September 2000. The reason behind selection of mid April was that updated records on KA admission in the hospitals were only available after mid-April, 2000 (i.e. the first month of the Nepalese year). The results from the medical records of JZH are given below:

Table I: Six Leading Causes of Admission in JZH

S. No.	*Months*	*KA*	*Normal delivery*	*L.S.C.S*	*Pain in abdomen*	*Broncho pneumonia*	*Encephalitis*	*Total*
1.	Baisakh	13	-	-	-	-	-	-
2.	Jestha	10 (7.94)	96 (76.20)	8 (6.35)	7 (5.55)	1 (0.80)	4 (3.16)	126 (100)
3.	Ashadh	57 (20.66)	192 (69.56)	5 (1.81)	13 (4.71)	2 (0.73)	7 (2.53)	276 (100)
4.	Shrawan	71 (21.38)	203 (61.14)	23 (6.92)	11 (3.31)	5 (1.50)	19 (5.72)	332 (100)
5.	Bhadra	29 (9.10)	208 (65.20)	23 (7.21)	16 (5.02)	33 (10.34)	10 (3.13)	319 (100)
	Total	167 (15.86)	699 (66.38)	59 (5.60)	47 (4.46)	41 (3.90)	40 (3.80)	1053 (100)

Note: "-" Indicates data not available; ( ) Figures in parentheses indicate percentage
Source: Calculations based on data from JZH

Similarly, the medical records of MDH are given below:

Table II: Six leading Causes of Admission in MDH

S. No.	*Months*	*KA*	*Normal delivery*	*(PUO) fever*	*T.B.*	*Pain in abdomen*	*PV Bleeding*	*Total*
1.	Baisakh	15 (38.46)	16 (41.02)	1 (2.56)	3 (7.70)	3 (7.70)	1 (2.56)	39 (100)
2.	Jestha	14 (20.00)	29 (41.42)	19 (27.14)	3 (4.28)	3 (4.28)	2 (2.88)	70 (100)
3.	Ashadh	27 (40.90)	30 (45.45)	5 (7.57)	4 (6.08)	0	0	66 (100)
4.	Shrawan	15 (24.60)	31 (50.82)	12 (19.67)	2 (3.27)	0	1.64	61 (100)
5.	Bhadra	15 (21.13)	24 (33.80)	24 (33.80)	7 (9.86)	0	1 (1.41)	71 (100)
Total		86 (28.01)	130 (42.35)	61 (19.87)	19 6.19)	6 (1.95)	5 (1.63)	307 (100)

Note: ( ) Figures in parentheses indicate percentage
Source: Calculations based on data from MDH; "T.B." is tuberculosis

For JZH and MDH the leading cause of admission is "Normal delivery". However, "Normal delivery" is a natural phenomenon and, if excluded, then the leading cause of admission for both JZH and MDH is KA. It is also interesting to note that the other leading causes of admission in both hospitals after "Normal delivery" and KA may be categorized as being both a natural phenomenon and that of a disease. The next table presents the direct cost of different leading causes of admission in JZH and MDH.

The evidence of direct cost for JZH and MDH is not as clear cut as for the prior. For JZH, the highest total cost for Doctor and Nursing Staff was attributed to "Normal delivery" while a close second was L.C.S.C.; KA was a consistent third. On the other hand, in MDH, the highest total cost for both Doctors and Nursing Staff was KA with Tuberculosis and "Normal delivery" being respectively second and third.

It should be noted that conceptually there is an additional component for determining the direct cost of KA which is reflected in the total

cost for laboratory technicians. However, the nature and environment in DMD made the calculation of the laboratory technician cost for KA difficult as well as being unable to calculate the laboratory technician cost for other diseases. Since it was determined that this cost for KA was significantly less than 1% of either the doctor or nursing staff cost for KA it can be safely excluded from the comparison.

Table III: Total Cost for Doctors and Nursing Staff of Six leading Causes of Admission in JZH and MDH

JZH			
S. No.	*Cause of Admission*	*Total Cost (Rs.) - Doctors*	*Total Cost (Rs.) - Nursing Staff*
1	KA	15,782.50	27,294.48
2	Normal delivery	20,970.00	57,122.28
3	L.C.S.C.	19,912.50	28,928.88
4	Pain in abdomen	564.00	853.52
5	Bronchopneumonia	2,152.50	1,954.47
6	Encephalitis	720.00	1,089.6
MDH			
S. No.	*Cause of Admission*	*Total Cost (Rs.) - Doctors*	*Total Cost (Rs.) - Nursing Staff*
1	KA	5,555.60	10,994.24
2	Normal delivery	3,952.00	8,798.40
3	P.U.O. (fever)	1,390.80	1,376.16
4	Tuberculosis	4,115.40	6,108.12
5	Pain in abdomen	72.96	90.24
6	P.V. Bleeding	152.00	112.80

Note:

1. Total Cost for doctors are obtained by first obtaining per minute cost of doctor service from the formula: $\frac{AMS}{TWDinMonth \times TWHinDay \times 60}$ where "AMS" is average monthly salary, "TWDinMonth" is the total working days in a month, "TWHinDay" is the total working hours in a day and "60" refers to 60 minutes. Additionally, it was assumed that there were 26 working days in a month (i.e. Saturday is the only holiday for doctors in a week). Each work day consist of 8 work hours. Also, the average monthly salary of the doctors were calculated from discussion. From this information, where the values for the numerator and denominator are obtained, the total cost for doctors is calculated.
2. Total Cost for nursing staff are obtained as above.

The next table attempts to capture the indirect burden of the six leading cause of admission on LHS:

Table IV: Bed Occupancy Rate of Six Leading Causes of Admission in JZH and MDH

JZH		
S. No.	Cause of Admission	Bed occupancy rate
1	KA	19.52
2	Normal delivery	9.32
3	L.C.S.C.	3.47
4	Pain in abdomen	1.01
5	Bronchopneumonia	1.91
6	Encephalitis	1.67
MDH		
S. No.	Cause of Admission	Bed occupancy rate
1	KA (MDH)	38.99
2	Normal delivery	6.93
3	P.U.O. (fever)	9.76
4	Tuberculosis	28.88
5	Pain in abdomen	0.64
6	P.V. Bleeding	0.53

Note:

1. The formula for the bed occupancy rate is calculated as : $\frac{\text{NOID}}{\text{Beds*30*months}} * 100$ where "NOID" is the actual number days patients were in the hospital bed within the study period (5 months). This figure was obtained from hospital register by counting, for each day for five months, the total number of beds occupied by a case category. The denominator gives the maximum number of bed occupancy. "Beds" are 125 and 25 respectively for JZH and MDH. "30" is the number of days per month while "months" represent the number of months which, for this study, is five. For example in JZH it is (125 X 30 X 5 = 18,750) which means that if the bed are occupied full for five months, total inpatientsdays will be 18,750. Lastly, "100" is 100.

The above table shows that KA consistently had the highest "Bed Occupancy Rate" in both JZH and MDH. In JZH this was followed by "Normal delivery" while in MDH this was followed by "Tuberculosis". This suggests that the indirect burden of KA is highest on the LHS in DMD.

DISCUSSION

The results provided are the most recent available data from the LHS of DMD. However, a caveat, which is generally true for all developing countries, is that the data are poorly maintained and are not up to date. Nonetheless the results suggest that, at an absolute level, there is a significant burden of KA on the LHS in DMD seen directly by total cost of doctors and nurses staff as well as indirectly through bed occupancy. In addition,

greater number of KA patients also add to the cost of medical supplies, meal and other services provided free of cost by the LHS. The average cost of these items for a KA patient was estimated to be around Rs. 4990. Such a high expenditure puts a heavy burden to the already resource scarce LHS consequently reducing the quality of diagnosis and treatment of KA patients. This may further aggravate the situation through treatment failure and other cumulative burden to the LHS.

While the above statement is true, some comments can be made. First, glancing at the total data initially suggested that "Natural delivery" has the greatest burden for LHS in DMD. However, the differentiation has to be made between natural causes of admission and those caused by disease. Further, the higher frequency of admission is not consistent with the total cost to doctors and nursing staff as well as the bed occupancy rate. In other words, first impressions may be misleading which requires an in-depth assessment when determining the burden of disease on LHS.

Likewise, it is difficult to determine the burden on LHS relative to other diseases (such as encephalitis, malaria and tuberculosis). This is because the treatment of those diseases can be carried out in most of the LHS other than in JZH and MDH. For example, take the treatment of tuberculosis, this can be done in both the health posts and sub-health posts using the DOTS treatment. The same thing is true for many other diseases. The absence, at times, of other diseases in JZH and MDH does not indicate lack of presence in the districts but simply reflects their absence in those particular institutions. In other words, diagnosis and treatment for those other diseases were taking place in the other institutions of the LHS in DMD.

This later part therefore suggests a corollary that the definition of LHS must necessarily vary with the disease. For KA, LHS is focused on those institutions which can offer diagnosis and treatment. These necessarily mean JZH and MDH in DMD. It is also important to note that because of this narrow definition of LHS for KA, comparison of the burden on LHS with other diseases in DMD is difficult. Nonetheless, it is clear that there is a significant burden on LHS in DMD by KA, as LHS is defined where LHS is limited to one hospital per district.

By ending, an observation is made that there is a small, yet significant, percentage of non-Nepali patients which accounted for 2 and 6 percent respectively of total patients in JZH and MDH; these statistics were calculated on the basis of hospital and patient records however doctors in DMD, during the course of interview, mentioned that those figures may be underestimated. It should be mentioned that the reason behind the higher percentage, by three times, of non-Nepali patients in MDH was that it was closer to the Nepal-India border. It would appear that non-Nepali patients were attracted to Nepal for treatment of KA because Fungizone, the anti-KA drug used in JZH and MDH, is provided free of cost. This situation of treating non-Nepali patients

resulted in a draining of resources from DMD and has added to the burden on the LHS. This observation, i.e. the cross-border burden of KA on LHS, is therefore an interesting avenue for further exploration.

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REFERENCES

1. Luna, J. M. (ed.). Kala-alzar in Nepal, Principles, Practice and Public Health Perspectives . Nepal : BPKIHS, HMG-MoH-DHS, WHO/Nepal. 1998.
2. Wijeyaratne, P. M., L. K. Jones Arsenault, C. J. Murphy. "Endemic disease and development : the leishmaniases." Acta Tropica. **56** (1994) 349 - 364.
3. Tren, Richard. (2000) "The Economic Costs of Malaria in South Africa." Http://www.iea.org.uk/env/malaria.htm.