



Ophthalmic Epidemiology
0928-6586/01/US\$ 16.00

Ophthalmic Epidemiology
– 2001, Vol. 8, No. 2–3,
pp. 181–190
© Swets & Zeitlinger 2001

Accepted 20 December 2000

Magnitude of trachoma and barriers to uptake of lid surgery in a rural community of northern Nigeria

Mansur M. Rabi
Adenike Abiose

The National Eye Center, Kaduna, Nigeria

Abstract

AIMS A population-based cross-sectional survey for trachoma prevalence was conducted in a subdistrict of northern Nigeria. The objectives of the survey were to determine the magnitude and pattern of trachoma and the barriers to uptake of lid surgery in the area.

METHODS A total of 2903 people of all ages were examined out of 3715 registered eligible persons. The study population was chosen by a two-stage cluster random sampling technique. Each person was examined for signs of trachoma. The World Health Organization (WHO) simplified trachoma grading was used. Persons with trichiasis that had not attended hospital were asked why they had not sought hospital treatment.

RESULTS A blindness prevalence of 1.5% (95% CI 0.4%–2.7%) was found in the study population. About 20% of the blindness were due to trachoma. The prevalence of trichiasis among women 15 years and above was found to be 8.6% (95% CI 6.8%–10.7%). The prevalence of active trachoma among children was 11.8% (95% CI 10.1%–13.3%). Over 90% of people with trichiasis have not sought medical attention. The major identified factor that prevents people from accessing hospital treatment for trichiasis was cost (57%).

CONCLUSION This study suggests that trachoma is of public health significance in this area; as such, an effective trachoma control program with emphasis on lid surgery should be established.

Key words Trachoma; trichiasis; lid surgery; blindness prevention; rural health care; Nigeria

Introduction Trachoma is the major cause of preventable blindness in many underprivileged communities of developing countries. The dry arid Sahel belt of West Africa, stretching from Senegal to Chad, is severely affected by trachoma.¹ The northern region of Nigeria falls

Correspondence and reprint requests to:

Dr. M.M. Rabi, MSc.CEH, FWACS,
FMCOph
Dept. Clinical Ophthalmology
National Eye Center
P.M.B. 2267
Kaduna, Nigeria
Tel.: +234 062 315026
E-mail: mrabi@hotmail.com

Acknowledgements:

We would like to thank the sponsors of this work: the International Eye Foundation USA. We are also grateful to Dr. Allen Foster of the London School of Hygiene and Tropical Medicine, Dr. A.D. Negrel of the World Health Organization as well as Dr. Ellen Schwartz of the International Center for Eye Health, London for their suggestions. Dr. A.O. Mahmoud, the Secretary of the Nigerian program for the prevention of blindness, was also very helpful.

within this belt with a likely high prevalence of trachoma in the poor remote areas of this region.

However, there are no epidemiological data on the severity of this disease in the region. The dearth of such data has made the governments relegate the disease to the background in all disease control activities, especially as the disease occurs mainly in the isolated communities.

Trachoma Rapid Assessment (TRA),² recently introduced by the World Health Organization (WHO), has been advocated as a simple, rapid and cost-effective method of detecting priority areas for attention to trachoma. However, this methodology only gives a rough picture of areas with blinding trachoma. As such, an epidemiologically sound baseline in the form of data from household surveys is essential in suspected areas, not only to determine the magnitude of the problem but for the monitoring and evaluation of control programs.

A cross-sectional study was thus designed to provide some data on the magnitude of trachoma in one of the highly trachoma-susceptible areas of northern Nigeria. On the basis of such data, an appropriate control program could be planned in the area. In establishing control programs for trachoma, it is essential to determine the form of trachoma prevalent, so that control programs can be streamlined to the communities' needs. A predominance of trichiasis with less active disease emphasizes the need for the provision of lid surgery services.

However, previous reports³ have shown that the presence of such surgical services may not necessarily translate into usage by the people. Thus, it is necessary to determine the barriers that are likely to prevent the people from using such services. This study was designed to acquire all this information.

Materials and methods The study was a community-based cross-sectional survey carried out in the Kaita Local Government Area (LGA) of Katsina State in northern Nigeria. The study was conducted in the months of April and May, 1999.

SAMPLE SIZE A minimum sample size of 4400 was determined for the survey of active trachoma and trichiasis in the study area using the following parameters:

Minimum sample size for active trachoma in children 0–15 years The population of children 15 years or less in the study area was estimated to be 60,000 (i.e., 50% of the total population of 122,000 in the area). There are no age-specific population data, but available census data show that children 15 years and below constitute about 50% of Nigeria's population.⁴ The estimated prevalence of active trachoma among children in the area was put at 25% with a maximum tolerable error of 5%. This was based on a reported prevalence of active trachoma of 26% among children (1–10 years) in the northern Damongo area of Ghana.⁵ A design effect of 6 was chosen. The choice of a large design effect was based on the fact that the survey is a cluster sampling study of a disease that clusters highly in communities (i.e., active

trachoma). These parameters gave a minimum sample size of 1680 for an active trachoma survey in children.

Minimum sample for trichiasis in people older than 15 years The following parameters were used in calculating the minimum sample size for a trichiasis survey in adults. The total population of people over 15 years of age in the area was estimated at 60,000. An estimated prevalence of trichiasis among adults in the area was put at 5%, with a maximum tolerable error of 2%. This estimate was based on a trichiasis prevalence of 3% among adults reported in the northern Damongo region of Ghana.⁵ A design effect of 5 was chosen for the survey. The choice of a high design effect was based on the fact that the survey is a cluster sampling study of an infectious disease known to cluster highly in communities (i.e., trachoma). These parameters gave a minimum sample size of 2197 for a trichiasis survey in adults.

It was expected that a population-based house-to-house survey of about 2200 adults in the study area would encounter almost the same number of children (i.e., 2200), since about 50% of Nigeria's population is made up of children 15 years and below.⁴ This study was thus planned to examine at least 2200 adults for trichiasis and 2200 children for active trachoma, a total of 4400 subjects of all ages. This approach for calculating a single minimum sample size for both trichiasis and active trachoma was evolved to ease the conduct of the survey; so that the survey teams, on visiting a household, could examine all the inhabitants of the household at once.

SAMPLING DESIGN The study population was chosen by two-stage cluster random sampling. In the first sampling stage, 15 villages (clusters) were randomly chosen from the sampling frame of 122 villages in the Local Government Area. The selection was done using probability proportional to size (PPS). In the final sampling stage, 300 people of all ages were randomly selected in each village. They were selected by randomly choosing a direction in the village and examining all persons in the households along the direction. This was continued along that direction until the sample of 300 persons required for the survey was attained. In villages with a total population less than 300, all persons in the village were included in the study.

PRE-SURVEY ACTIVITIES Ethical approval for the conduct of the survey was obtained from the Ethical committee of the National Eye Center, Kaduna. The consent of the state Ministry of Health, the Local Government health department and the respective village chiefs was obtained. A training session for two days was conducted before the commencement of the fieldwork. This involved training and standardization of the WHO trachoma grading system among the field workers. A small pilot study was carried out before the commencement of the survey in order to identify and rectify possible logistic difficulties in the field.

DATA COLLECTION PROCEDURES On arrival in each household, permission was sought from the head of the household to examine

him and members of his household. All subjects in the selected households passed through two stages: registration/visual acuity and eye examination.

1st stage: Registration/visual acuity The visual acuity of all persons in the household was measured with Snellen's tumbling 'E' chart. Each eye was tested separately and recorded. Small children and adults whose vision could not be determined (as in demented or deaf persons) were judged as 'believed blind' or 'believed not blind'. The name, age, occupation, and literacy level of the people were also recorded. Persons absent during the survey were also recorded.

2nd stage: Eye examination Subjects were then examined using a pentorch and a loupe. Everted lids were examined for trachomatous inflammation, scarring or trichiasis. All features of trachoma were recorded using the WHO simplified grading system.⁶ For each eye examined, the most severe of the trachoma grading present was recorded. Persons with corneal opacity that did not seem to be due to trachoma were grouped into 'non-trachomatous corneal opacity', while individuals with no sign of any form of trachoma were categorized as 'no trachoma'. Persons with trichiasis were asked what form of treatment they were using; those who had not gone to the hospital for treatment were further asked why they had not visited the hospital for trichiasis treatment.

All information was entered into a data-entry format already developed in the Epi info computer program and analyzed.

STATISTICAL ANALYSIS For the analysis, any visual acuity recorded as 'believed blind' was grouped into the blind vision category, while visual acuity recorded as 'believed not blind' was grouped into the normal vision category. Blindness was defined as a presenting acuity of less than 3/60 in the better eye, while low vision was defined as a presenting visual acuity of less than 6/18 but equal to or better than 3/60 in the better eye. All children aged less than one year were grouped as one-year-olds.

Results Of the total of 4400 persons expected to be examined, only 3715 people were registered in the villages. This was because some selected villages had a total population less than the required 300 persons. A total of 2903 people of all ages were examined out of the 3715 registered eligible subjects in the 15 randomly selected villages of the study area, making a coverage of 78%. The low coverage rate was attributed to the absence of 'labor migrants' during the survey. These are males in the age bracket 20 to 50 who rush to the towns to take up temporary jobs during the non-planting season. The survey was conducted during this period.

AGE- & SEX DISTRIBUTION OF THE SAMPLED POPULATION Of the 2903 subjects examined in the survey, 1233 (42.7%) were males and 1660 (57.4%) were females. In the age groups 21-30, 31-40 and 41-50, the number of males was much lower than that of females. This is believed

Age-Sex Pyramid

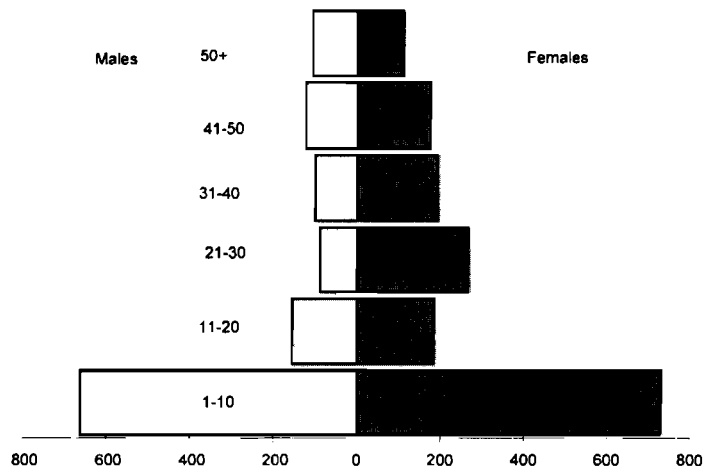


Fig. 1. Age- and sex-pyramid of the sampled population.

Age group	No. of males	No. of females	Prevalence (total)
1-10	1	1	0.14% (2)
11-20	-	-	-
21-30	-	-	-
31-40	-	2	0.68% (2)
41-50	3	5	2.68% (8)
51+	14	18	14.68% (32)
Prevalence (total)	1.46% (18)	1.56% (26)	1.52% (44)

TABLE 1. Prevalence of blindness by age group and sex.

to be due to the perennial 'labor migration' by the healthy males in the age bracket 20-50. The age- and sex distribution of the examined population is shown in Figure 1.

PREVALENCE OF BLINDNESS A total of 44 people were found to be bilaterally blind, and a further 145 people had low vision in the better eye. Thus, the prevalence of blindness in the sampled population was found to be 1.5% (95% CI 0.4%-2.7%), while the prevalence of low vision was 5.0% (95% CI 4.0%-5.9%).

Trachomatous corneal opacity was responsible for bilateral blindness in 9 people. This means that trachoma was responsible for about 20.4% of the blindness in the study.

Blindness by sex Males had a blindness prevalence of 1.46% (18/1232; 95% CI 0.7%-2.6%), while females had a blindness prevalence of 1.56% (26/1660; 95% CI 0.9%-2.5%). However, the difference between the two sexes is not statistically significant ($\chi^2 = 0.01$, $p = 0.94$). The prevalence of blindness by age group and sex is shown in Table 1.

TRICHIASIS The prevalence of trichiasis in the study population was 3.47% (101/2903; 95% CI 2.4%–4.5%): males 2.0%, females 4.5%. The difference between the trichiasis prevalence in males and females was significant. ($\chi^2 = 11.62$, $p = 0.0006$). The prevalence of trichiasis in women older than 40 years was found to be 11.5%. Trachomatous corneal opacity was responsible for blindness in one or both eyes of 14 people (9 people with bilateral blindness), constituting a prevalence of trachomatous corneal opacity (CO) of 0.48% in the whole population.

Trichiasis by age groups The prevalence of trichiasis ranged between 2.95% and 12.84% across the different age groups. The prevalence increased with age; so that the age group 50+ had the highest prevalence of 12.84%. Table 2 shows the prevalence of trichiasis by age group and sex.

Vision in patients with trichiasis Among the 101 people recorded with trichiasis (but no significant corneal opacity), only four were bilaterally blind (from other causes such as cataract); 24 people had low vision and 73 people had normal vision. About 55% of the people with normal vision were undergoing local epilation or receiving hospital treatment.

Mode of treatment for trichiasis Of the 101 people with trichiasis found in the study, 50 were receiving traditional treatment (mainly local epilation), only seven were receiving hospital treatment and two people were receiving both hospital and traditional treatment. Forty-two people were not receiving any form of treatment for their trichiasis.

ACTIVE TRACHOMA The prevalence of active trachoma in the whole population was 9.4% (95% CI 8.4%–10.5%). However, the prevalence of active trachoma in children 10 years of age and below was 11.8% (165/1389; 95% CI 10.1%–13.3%); boys 13.5%, girls 10.4%. The difference in the prevalence of active trachoma between boys and the girls was not statistically significant. ($\chi^2 = 2.72$, $p = 0.099$).

The prevalence of active trachoma among the different age groups ranges from 11.8% to 4.4%. The highest prevalence was in the age group 1–10. Table 3 shows the prevalence of active trachoma by age-group and sex.

TOTAL TRACHOMA PREVALENCE There were 354 people that were found to have active trachoma, trichiasis, trachomatous corneal opacity

TABLE 2. Prevalence of trichiasis by age group and sex.

Age group	No. of males	No. of females	Prevalence (total)
11–20	4	6	2.95% (10)
21–30	4	17	5.93% (21)
31–40	4	19	7.88% (23)
41–50	8	11	6.38% (19)
51+	6	22	12.84% (28)
Prevalence (total)	2.0% (26)	4.5% (75)	3.47% (101)

Age group	No. of males	No. of females	Prevalence (total)
1-10	89	76	11.88% (165)
11-20	11	18	8.58% (29)
21-30	6	21	7.63% (27)
31-40	5	8	4.45% (13)
41-50	15	10	8.39% (25)
51+	8	6	6.42% (14)
Prevalence (total)	10.86% (134)	8.39% (139)	9.45% (273)

TABLE 3. Prevalence of active trachoma by age group and sex.

Barriers	Males	Females	Percentage
Cost	23	34	62.0
No benefit	10	17	29.3
Distance	1	3	4.3
No escort	-	4	4.3
Total	34	58	100.0

TABLE 4. Barriers to hospital treatment for trichiasis.

or a combination of any of the trachoma signs. Thus, the total prevalence of trachoma in the study population was 12.2%.

BARRIERS TO RECEIVING HOSPITAL TREATMENT FOR TRICHIASIS
 About 57% (57/101) of the persons with trichiasis could not go to the hospital because of financial handicaps, while about 27% (27/101) felt that it was not necessary to have any medical attention. Most respondents in this category had a mild form of trichiasis with no effect on vision and minimal discomfort; as such, they seem not to want to take the trouble for treatment at present. Four people each complained of the distance to the hospital and of having 'no escort' to the hospital as hindrances to hospital treatment. The barriers did not seem to differ between males and females. Table 4 shows the identified barriers by sex.

Discussion The high prevalence of blindness in this area (1.5%) is not unexpected for an isolated rural community in a developing country with an average daily income of less than two US dollars. Nigeria's GNP per capita stood at only \$260 in 1995;⁷ also, this area is a trachoma prone area and has no eye care service within its reach. The absence of eye care services in the area may explain the high prevalence of cataract blindness of 3.6% among persons 40 years and older, with a very low cataract surgical coverage (CSC) of 4.0% in the area as reported by a recent survey.⁸ A survey conducted in the Dambatta area of Kano state, which is about 200 kilometers from the survey area, reported a blindness prevalence of 1.14%.⁹ Other blindness prevalence surveys in northern Nigeria have quoted values ranging from 1.0% to 3.3%. Zubair reported a blindness prevalence of 1.70% in the Asa Local Government area of Kwara state,¹⁰ while Abiose et al. reported

a prevalence of 3.3% in an onchoendemic area of northern Nigeria.¹¹ The Nigerian National Program for the Prevention of Blindness (NPPB) extrapolated that the prevalence of blindness in Nigeria as a whole is 1.3%.¹²

The prevalence of trichiasis among women older than 40 years, which was found to be 11.5% in this study, is far above the 1% level of trichiasis in women 40 years and over that constitutes the World Health Organization's definition of an area with trachoma of public health significance.¹³ Although no trachoma survey has been conducted in the area previously, anecdotal information suggested that it is an area with a high rate of blinding trachoma. This is not surprising, considering the apparent presence of socio-ecological risk factors for the disease in the area. This includes the poor socio-economic level of the people, inadequate supply of water, poor personal and environmental hygiene conditions and the climatic aridity of the environment.

Various blindness prevalence studies in the northern part of Nigeria have also found trachoma to be a significant cause of blindness in the area. In the Dambatta area of Kano State, trachoma was responsible for 17% of blindness,⁹ while in the Asa Local Government area of Kwara State trachoma constituted 13.6% of blindness.¹⁰ The NPPB has extrapolated that in the whole country (Nigeria), trachoma and other cornea-related disorders are responsible for 11.5% of adult blindness.¹¹ In the neighboring Niger Republic, a survey in the Tahoua region reported a general trichiasis prevalence of 1.2%,¹⁴ while in Ghana, a survey of three villages in the northern region of Damongo reported a trichiasis prevalence in adults of approximately 3.0%.⁵ In the Moroccan region of Quarzazate, trichiasis prevalence is estimated to be 2.2% with a prevalence of central corneal opacity of 3.3%.¹⁵

The prevalence of active trachoma (TF/TI) among children 10 years of age and below was found to be 11.7% (95% CI 10.1%–13.6%). This value is above the 10% level that constitutes the World Health Organization's definition of an area with trachoma of public health significance. The pattern of trachoma in this study shows that trichiasis is more severe than active trachoma. This may suggest that trachoma is generally on the decline in the area, even though it still constitutes a public health problem.

In the Dambatta area of Kano State, Nigeria, a trachoma prevalence of 4.4% was reported in children.⁹ In the Niger Republic, trachoma prevalence in children 0–20 years of age was found to be 28–68% in the Zinder region of the country.¹⁶ In the West African country of Burkina Faso, a study reported 13% of active trachoma in 2–5 year olds,¹⁷ while in Ghana, a survey of three villages in the northern region of Damongo found the prevalence of active trachoma in 1–10 year-olds to be approximately 26%.⁵ In Morocco, a prevalence of active trachoma of 18% was reported in the Quarzazate region.¹⁵

The main barrier to uptake of hospital services among persons with trichiasis was economic. About 57% could not go to the hospital due to the cost involved. In this environment, the indirect cost (lost wages during visits to the hospital, feeding costs and other intangible costs incurred in seeking hospital attention) may be more than the direct cost (hospital charges) involved in the treatment. Therefore, the sum of the

direct and indirect costs of seeking treatment is beyond most people. Cost has been a recurring factor as a barrier to uptake of eye care services in most developing countries. A study in central Tanzania reported the barriers to trichiasis surgery among women to include cost, the problem of children being left behind, and the lack of an escort to the clinic/hospital.¹⁸ The international workshop on strategies to improve uptake of eye services that was held in Tamil Nadu, India in 1997 also identified cost as a major hindrance to the access to eye care services by people in developing countries.¹⁹ About 27% of the persons with trichiasis who did not seek hospital care in this study felt that there was no benefit in seeking hospital treatment. This is believed to be either because they feel that their condition is mild and they need no treatment now, or because they feel that hospital treatment is not worth it since they can epilate the offending eyelashes themselves with a local epilator.

The absence of the 'labor migrants' during the conduct of the survey may have affected the accuracy of the results. The data may over-estimate some values, as most of the 'missed' subjects are likely to be visually healthy, since they are middle-aged, economically active people. The census data used in the survey also seem unreliable as far as the population of some villages is concerned. This has affected the study design in terms of the choice of cluster size and the minimum sample size. The dearth of data on sex and age for the whole population prevented the calculation of age- and sex-adjusted prevalence values.

Conclusion Some regions of the world still have blinding trachoma that requires urgent attention from local health authorities in collaboration with local and international non-governmental organizations. An integrated blindness control program with emphasis on free lid surgery and distribution of topical antibiotics or azithromycin tablets is imperative in such disadvantaged areas of the world. Primary health centers should be strengthened. Through community mobilization, rural people can be encouraged to participate in the provision of water to themselves through self-help projects.

References

- 1 World Health Organization. *Future approaches to trachoma control*. Report of a global scientific meeting. Geneva: World Health Organization, 1996. WHO/PBL/96.50:4.
- 2 World Health Organization. *Planning for the global elimination of trachoma (GET)*. Report of a World Health Organization (WHO) consultation. Geneva: World Health Organization, 1997. WHO/PBL/97.60:12-3.
- 3 Fletcher A, et al. *Barriers to using eye services and recommendation to improve service uptake*. Research finding and international workshop recommendation. Madurai, India, 1998:10.
- 4 Bulletin of the National Population Commission 1997, National headquarters, Abuja Nigeria.
- 5 World Health Organization. *Trachoma control program in the northern region of Ghana*. Planning for the Global Elimination of Trachoma (GET); report of a WHO consultation. Geneva: World Health Organization, 1997. WHO/97.60:15-7.
- 6 Thylefors B, Dawson C, Jones BR, West SK, Taylor HR. A simple system for the assessment of

- trachoma and its complications. *Bull WHO*. 1987;65:477-83.
- 7 The World Health Report 1998. *Life in the 21st century. A vision for all*. Geneva: World Health Organization, 1998:222-6.
 - 8 Rabiu MM. *Prevalence of cataract blindness and barriers to uptake of cataract surgery in a rural community of northern Nigeria*. MSc dissertation. London: International Centre for Eye Health, University College, 1999.
 - 9 Lawan A. *Prevalence and causes of blindness and visual impairment in Dambatta Local Government of Kano State, Nigeria 1995*. Fellowship dissertation. Lagos: National Postgraduate Medical College of Nigeria, 1995:45.
 - 10 Zubair SL. *Prevalence and causes of blindness and low vision in Asa Local Government Area of Kwara State, Nigeria*. Fellowship dissertation. Lagos: National Postgraduate Medical College of Nigeria, 1996:40-65.
 - 11 Abiose A, Murdoch I, Babalola O, Cousen S. Distribution and etiology of blindness and visual impairment in mesoendemic onchocercal communities, Kaduna State Nigeria. *Comments in Br J Ophthalmol*. 1994;78(1):3.
 - 12 Bulletin of the National Program for Prevention of Blindness (NPPB). Kaduna: National Secretariat, National Eye Center Kaduna, 1998.
 - 13 *Future approaches to trachoma control*. Report of a global scientific meeting. Geneva: World Health Organization, 1996. WHO/PBL/96.56:12.
 - 14 Hugnet P. Trachoma in Niger (Results of a sample survey in the department of Tahoua). *Rev Int Trach Pathol Ocul Trop Subtrop Sante Publ*. 1989;66(1-2):31-41.
 - 15 Negrel AD, Khazraji YC, Akalay O. Trachoma in the province of Quarzazate, Morocco. *Bull WHO*. 1992;70(4):451-6.
 - 16 Kabo AM, Idi M. Trachoma in the department of Zinder. *Rev Int Trach Pathol Ocul Trop Subtrop Sante Publ*. 1989;66(1-2):43-54.
 - 17 Hutin YJ, Bailey R, Bougoum I, Mabey DC. Trachoma in Sabou area (Burkina-Faso). An epidemiological investigation. *Bull Soc Pathol Exot*. 1992;85(5):350-4.
 - 18 West S, Lynch M, Munoz B, Katala S, Tobin S, Mmbaga BB. Predicting surgical compliance in a cohort of women with trichiasis. *Int Ophthalmol*. 1994;18(2):105-9.
 - 19 Fletcher A. *Barriers to using eye services and recommendation to improve service uptake*. Research finding and international workshop recommendation. Madurai, India, 1998:49-51.