

Typhoid in a Tongan village

ALANI TANGITAU *

Introduction

The object of this study is to examine the main factors associated with the endemicity of typhoid fever at the village of Nakolo, Kingdom of Tonga. The study includes the determination of the prevalence of healthy carriers; an evaluation of current living and environmental conditions; and an assessment of the typhoid management procedure currently employed by the Ministry of Health.

The earliest records of typhoid cases available at the Ministry of Health is 1962 but comments from medical staff at Vaiola Hospital indicate typhoid has been present long before this. The highest recorded annual incidence of typhoid in Tonga was 380 per 100,000 during the 1962/63 year¹. An overall incidence of 2 cases per 100,000 was reported in 1983².

Markvart reported that there was no death from typhoid between 1978 and 1989 and attributes this to early detection and proper management³. He added that community vaccination campaigns and periodic vaccination of individuals has failed to reduce typhoid incidence in Tonga³. Kopecky noted a desire of the Typhoid Fever Working Group for closer cooperation between members and the need for sanitary, fly proof latrines in Tongan villages⁴.

Nakolo village is 15 km south of Nuku'alofa, the capital city on the main island of Tongatapu. Randomly chosen out of known endemic areas, Nakola, was one of the 'hot spots' during past typhoid outbreaks. From the village of Nakolo there have been thirty confirmed typhoid cases including three carriers recorded by the Ministry of Health between 1972 and 1995 (Table 4)³. This represents an estimated average annual case incidence of 316/100,000.

Study method

Approval for the study was obtained from the Director of Health, the Medical Officer in charge of communicable diseases, the Fiji School of Medicine and the Chief of Nakolo village. The study team consisted of 2 health inspectors, 10 health officer trainees, two health education officers, and the author.

There were two well attended community meetings (*fono*) where the Medical Officer in charge of communicable diseases talked about typhoid and the role of the community in its control. A senior health education officer then emphasised the importance of environmental hygiene. The author explained the objectives of the study, clarified ethical considerations, and stressed environmental health aspects.

The study team members then visited every household in Nakolo where they conducted a population survey, gave health talks to the family about their living environment, distributed educational brochures, carried out a sanitary inspection and distributed plastic containers for stool specimens. The houses were then revisited

to collect stool specimens from all household members. The specimens were tested for typhoid bacilli.

“ It is unfortunate that 9.5% (39 people) of the village population refused to have their stools tested. Their decision was respected, but the possibility of further healthy carrier(s) remain. ”

Results

All the 72 houses at Nakolo were surveyed. The total population was 412 in June 1995 - an average of 5.7 people per household.

The styles of the dwellings, bathrooms and kitchens were classified as European, mixed, or traditional Tongan (see Table 1). The household toilets were classified as septic tanks, waterseal, pit latrine or none (see Table 2). SPT are defined as mechanically flushed toilets which drain into a septic tank or soil absorption system. WS are "Phillipino" style pans, manually flushed into a hand-dug receiving pit. Pit latrines are pans opening directly into a hand-dug receiving pit.

* Year 4 Medical Student, Fiji School of Medicine

	European	Mixed	Tongan	None	Total
Dwelling	53 (73.6%)	10 (13.9%)	9 (12.5%)	N/A	72
Bathroom	30 (41.7%)	19 (26.4%)	17 (23.6%)	6 (8.3%)	72
Kitchen	29 (40.3%)	11 (15.3%)	23 (31.9%)	9 (12.5%)	72
Total	112	40	49	15	

Household water was by public water supply connected to the house, rainwater tanks, public tap outlets, or no immediate water source (Table 3). There were no private wells in Nakolo. Refuse disposal was by burning (70%), burying (26%) or by carbage removal (4%)

Of the 90.5% of villagers who provided stool specimens, 90% tested negative for salmonella typhoid bacteria while 0.50% (2 cases) were positive and both these proved to be asymptomatic carriers.

Discussion

There have been 30 confirmed typhoid cases from Nakolo between 1972 and 1995. This is an average annual incidence of at least 316/100,000. There are no available records on typhoid cases from this area prior to 1972. Confirmed cases are shown in Table 4.

latrines were never sanitary and today 27% of the toilets at Nakolo are still of the pit latrine type (see Table 2). There are frequent failures of the reticulated water system lasting up to several days. At these times the whole village share the pit toilets. This is important in typhoid transmission as houseflies breed in pit latrines and carry the typhoid bacillus for as long as 20 days⁶. The low number of cases between 1974 and 1992 coincides with the introduction of the reticulated water system and suggests that cases since 1992 are not water borne but most likely via fly contaminated food.

The health education unit, established in Tonga in 1970, was administered by a full time medical officer whose main educational method was the use of a weekly radio program and the occasional fono (traditional community meeting). The normal approach to dealing with a typhoid outbreak was to send a district nurse to immunise the affected community. In addition, a health inspector would visit and check out the

	1987	1988	1989	1990	1991	1992	1993	1994	1995
SPT	14	15	18	21	22	25	27	27	29 (37.2%)
WS	9	9	11	13	7	3	9	12	24 (30.8%)
PL	31	29	29	27	31	33	28	26	21 (26.9%)
None	5	5	5	4	4	4	4	3	4 (5.1%)
Total	59	58	63	65	65	65	68	68	78 (100%)

Sanitation and hygiene were wanting in Nakolo prior to 1970. In the seventies there were very few houses with roofs that could be used as catchment areas and the mean monthly rainfall between 1945 and 1978 was 150.4 mm⁵. A reticulated water system was constructed in 1974 but prior to this the type of excreta disposal was the pit latrine. These pit

local environmental conditions and try to trace the source of infection. Suitable antibiotics for the treatment of proven cases were often lacking and there were no standard protocols for management of infected cases. Health planning was mostly inadequate in this area and action strategies during outbreaks were mostly improvised at the time.

	House connections	Rainwater tanks	Public tap	No immediate water source
Houses	32	17	23	5
People affected	202	120	158	16
% Population	49	29.1	38.3	3.9

	1972	73	74	75	80	84	85	89	92	93	94	95
Cases	2	7	8	1	1	1	1	1	1	-	2	2
Carriers	-	-	-	-	-	-	-	-	-	1	-	2
Total	2	7	8	1	1	1	1	1	1	1	2	4

The current Medical Officer in charge of communicable disease has introduced new management skills. There are new protocols for management and follow up of established cases, trained field teams who are called into action when a case is identified, improved laboratory expertise and equipment (although serological testing is still unavailable), and a choice of reliable antibiotics are always available. There is a qualified microbiologist at the central public health laboratory and there are more channels of communication for health education including daily radio programmes, posters, TV, monthly fono, free pamphlets and brochures, etc.

The establishment of a health centre about one kilometre from Nakolo, better sealed roads and cars, more reliable reticulated water supply, better household income and better educated generation may all contribute to reducing the incidence of this disease.

The sharp rise in number of detected cases in 1993-1995 (Table 4) may be attributed to the two healthy carriers who are sisters living close proximity to one another. They frequently visit each other's home and share food. They both live in an area of the village where most of the pit latrines are situated.

The number of households without a latrine has remained relatively constant since 1987. These households either belong to newly married couples with a new home or those that share a neighbour's toilet. It is unfortunate that 9.5% (39 people) of the village population refused to have their stools tested. Their decision was respected, but the possibility of further healthy carrier(s) remain.

Recommendations

1. Health programs and continuous improvement of sanitation and water supplies should always be a priority;
2. Existing ground water systems should be upgraded and introduced to other areas;
3. Laboratories at all district hospitals in the Kingdom, other than Vaiola, should be upgraded and be provided with the necessary equipment and qualified personnel to perform bacteriological tests for typhoid;
4. Serological testing should be made available to supplement the present testing on blood and stool;
5. Personnel involved in typhoid activities should be given training about typhoid and its control;

6. Typhoid control teams should be established, and continuously available when typhoid cases arise; and
7. The follow up system on patients should be extended to other islands and patients and carriers be encouraged to report any change of address.

Acknowledgements

The author appreciates the assistance of Dr. Taniela Lutui; the staff of the Communicable Disease Control; the Microbiological Laboratory; and the Health Education sections of the Ministry of Health. In addition, my thanks to all the Health Officer trainees; the Honorable Luani; the Town Officer, church leaders, elders and people of Nakolo. Finally, Drs. Jimione Samisoni, Narend Singh and Rex Hunton helped with this study. The author also gratefully acknowledges the financial support of the South Pacific Health Research Committee and the Health Research Council of New Zealand through a generous bulk grant to the Fiji School of Medicine.

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