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PACIFIC ISLANDS
DEVELOPMENT
PROGRAM

March 17, 1995

Dear George Balazs,

About 10 years ago, you kindly sent me a copy of a draft paper on Turtles in Tokelau — which I read with interest at the time and still have a copy of.

Anyway — I left my job in Auckland about 2 years ago to come here, & have just learned that you have been right next door for all those years! Over the years I have collected a good deal of "cultural stuff" in fishing in Tokelau, but have not had the time to publish much on it. But perhaps some time in the next couple of years I will get round to it — the enclosed paper is a scrap (done for an obituary festschrift) but may be of interest.

I'd like to talk with you some day. If you have time, give me a ring (944.7727) or perhaps leave a message if I'm not in.

Regards,

Tony Hayes

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MAN AND A HALF

**ESSAYS IN PACIFIC ANTHROPOLOGY
AND ETHNOBIOLOGY
IN HONOUR OF RALPH BULMER**

edited by

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ASPECTS OF SKIPJACK FISHING:
SOME TOKELAU 'WORDS OF THE SEA'

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University of Auckland

The core of this paper is the text and English translation of part of a speech by a Tokelau elder in which he explains some of the more arcane local knowledge about skipjack (*Katsuwonus pelamis*) and skipjack fishing. Although this may seem far removed from any of Ralph Bulmer's interests and concerns it does, in fact, pick up on a number of themes from his work. Had he worked on a mid-Pacific atoll, among a fishing people, Ralph would, we imagine, have sought just such texts as this, and would have found in fish and fishing strategies a field as fully worthy of his subtle ethnographic talents – as good to think – as the natural world and hunting techniques of the Kalam.

There are many close parallels between Tokelau attitudes to fishing and those of the Kalam to hunting (Bulmer 1981). There is, first of all, the obvious, undisguised pleasure which is involved. Tokelau men do many other things – planting, harvesting and maintaining households – but most of them think of themselves as fishermen above all else, and they talk about fishing incessantly. As hunting does for the Kalam, fishing involves considerable intellectual demands as well as a sense of real achievement and the chance to develop and display special skills. It also calls for a very broad knowledge and understanding of the natural environment; of stars, lunar cycles and seasonal changes (Bulmer 1974:11-12).

Much of the daily talk about fishing concerns details of the locale, conditions and catch from every canoe which returns to the village from the open seas beyond the reef. Most of this is practical, matter of fact sort of information – about currents, surface conditions, birds, baits, depths and so forth – which forms the basis of everyone's estimation of the best strategy to try next. Some men's estimations, however, are worth considerably more than others. Knowledge of fish behaviour and fishing techniques varies widely, and the more subtle and refined this knowledge is the less openly is it discussed. Tokelau men, so the local saying goes, pass on such information only to their sons, by a transaction referred to as *fakapaku*, the term used of an adult bird's feeding of its young. In spite of this, many of the more keen fishermen manage to accumulate expertise from a variety of sources, by observation, trial and error, and by 'stealing from the fathers of other men'. With age and accumulated experience such men come to have a profound and encyclopedic knowledge of all aspects of fishing, ranging from background ecological information to the finer points of etiquette and the codes of respect to be observed among fishermen at sea. When spoken about, especially in a ceremonial context, this sort of knowledge is spoken of as *kupu o te moana* 'words of the sea', and is regarded as among the most valuable gifts that an elderly man can bestow. Traditionally, the most important public occasions on which elders were expected to divulge their knowledge were the *kau kumete* ceremonies held to mark a man's attainments and accomplishments at sea and to initiate him into the status of *tautai*, or 'expert fisherman'.

The text which we present here derives, in a rather roundabout way, from a *kau kumete* held on Fakaofu in April 1971 to mark the culmination of what will undoubtedly remain the last traditional skipjack fishing expeditions to be held on the island. This has been described in some detail elsewhere (Hooper 1985) and it is sufficient to point out here that the circumstances were somewhat unusual, with the return of large numbers of schooling skipjack to the seas off the atoll after there had been none for about a generation. Since knowledgeable men, canoes and the proper equipment were all still available the whole community launched into an ecstatic 14 days of traditionally organised skipjack fishing. No schools of this scale have appeared off Fakaofu since 1971, although there have been smaller ones off the other two atolls of the group. But even if they did the Fakaofu men could no longer take the fish by traditional methods, simply because they have replaced almost all their canoes with aluminium dinghies and outboard engines.

At this particular ceremony, only four elders delivered themselves of their 'words of the sea', and there was much regret over the loss of traditional lore through the death or emigration of the "really expert old fishermen". Nevertheless, we made sound recordings of what was said, and in Auckland some six years later had the opportunity to play them to Peato Perez, one of the emigrant expert fishermen, who had been in New Zealand since 1968. The recordings enthralled him, although, in typical fashion, he withheld any judgemental comments on what his age-mates had said. Instead he went quietly home and prepared brief notes for an oration of his own, his own 'words of the sea', which he then recorded carefully and deliberately for us a couple of days later. This was his subtly indirect comment on their efforts as well his own gift to us and all who might be interested in the 'truly Tokelauan' matters from the past.

Peato Perez (1904-1980) was undoubtedly one of the most knowledgeable and articulate Tokelau traditionalists whom we have ever had the pleasure of working with. Born in Nukunonu, of parents who were, respectively, the son of a Portuguese trader and the daughter of one of the earliest Catholic converts on Fakaofu, he was raised by his mother's sister's family on Fakaofu and learned of traditional Tokelau things from his grandfather. After two years' training in Western Samoa, he became the catechist in Fakaofu in 1922 and held that position until 1945 when he was transferred to Nukunonu. It was during these years in Fakaofu that he gained his considerable reputation as a skipjack fisherman, being one of the very few men who ever caught more than 100 skipjack (in his case 107) on a single day's expedition. Traditionalist though he was in many ways, Peato saw that the future of his family lay in New Zealand, and he urged his children to emigrate. Only after they were established did he follow them, and he then worked at various menial jobs in the Wellington area until his final retirement. Although fluent in Samoan he knew very little English, and his entire life was spent within wholly Tokelauan social contexts.

The complete speech on fishing which Peato recorded in two separate sessions is some two hours long and is cast in the form of an address to novice fishermen, such as might be given at a *kau kumete*. It begins, not surprisingly, with aspects of skipjack fishing, regarded not only as a supremely difficult physical achievement but also as a weighty social event. The particular passages given here follow a long section on the proper handling of a rod, and concern three main topics: the particular point of a cast at which skipjack bite, how to make a strike to set the hook, and the predictions about schooling behaviour which can be made from the examination of skipjack gonads.

Some understanding of fishing methods is necessary. Skipjack fishing is done from 4 or 5 man canoes which are paddled rapidly through a school while only one man, the *tautai*, stands in the stern, facing aft, using a bamboo rod of between 2-3 metres in length to skip a pearlshell lure across the surface of the sea. Once a fish takes the lure the rod is used to swing the fish cleanly from the sea into the fisherman's hands: ideally, the hook is dislodged in the same movement and the fish falls into the bottom of the canoe (for a fuller account, see Macgregor 1937:110-12). When a large and productive school lingers in the vicinity of one of the atolls for a few days or more the whole village becomes involved and the fishing is done communally, with all available canoes at sea, working under the close direction of the elders. Such expeditions involve a number of special prohibitions and restrictions, and yoke together many important aspects of the whole Tokelau social and symbolic order.

TEXT

Passages 1 through 4 have to do with gauging the exact point during a cast at which skipjack will most likely take the lure. The term *tulaga* means, literally, 'a stand', and refers to the time when a canoe is making a pass close to the centre of a school and the *tautai* is standing, casting astern and then swinging the rod around in an arc toward the starboard beam, skipping the lure over the surface. Any such pass through a school, involving a distinct *tulaga*, will be most likely made without the canoe making a major change of direction, and hence holding the lure, on each cast, in the same range of positions relative to the sun. Skipjack schools are swift-moving, with the centres of feeding activity constantly changing, and a canoe generally has the opportunity to make only one pass before having to move several hundred metres to a new centre – which it

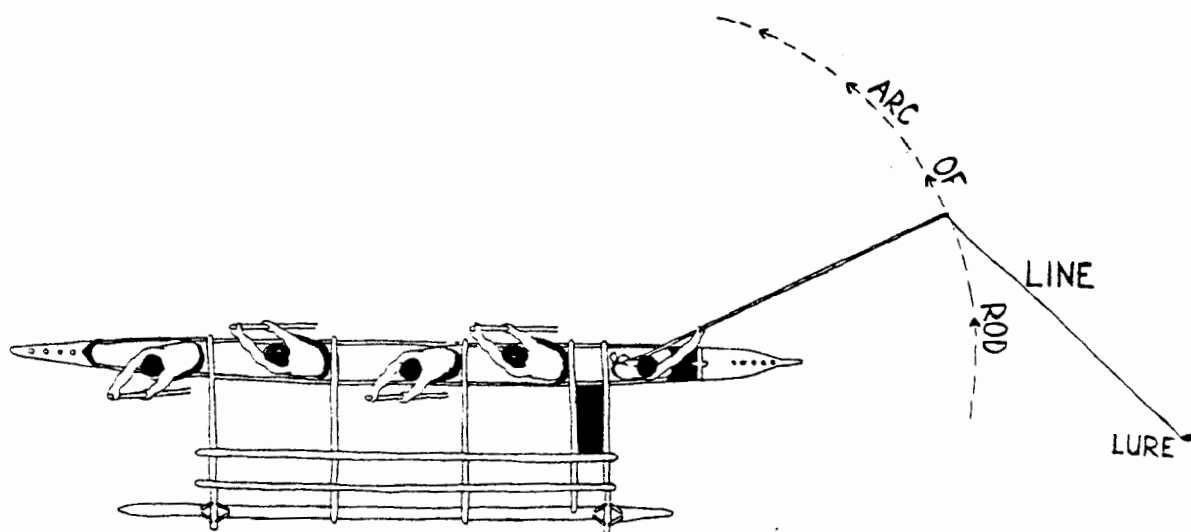


Figure 1: Tokelau skipjack fishing, showing relative positions of canoe, rod, line, and lure

may then pass through in a completely different direction in relation to the sun. Tokelau fishermen believe that allowing a hooked skipjack to drop back into the water will alarm the remainder of the school, causing the fish to sound and disappear. Hence the importance of being prepared for the exact point of a cast when fish are liable to take the lure.

1. Ko te taimi tenei e kai ai te atu kae koi au lava tau tulaga. E kehekehe na tulaga. E venei. Ko te tahi inukaiga o na tulaga, e hahau atu lava te pa, oi heheu ake lava, kae halafaki! Mau! Ko tona uiga, ia koe na he toe fakatamala. Ko te taimi lava tena e kai ai te atu. E paku atu lava, ve ake, kai! E paku atu, ve ake, kai.

2. Ko te tahi tulaga. (Ko ietahi tulaga foki e mautinoa e au), e hahau atu, toloheu ake, oho. Heheu ake, oho. Heheu ake, oho. Pa mai, kua feagai tonu ma koe i katea, kae kai. Ko tona uiga la, ko te mea lava tena e kai ai te atu. Ia koe lele la na fakatamala. E hahau atu lava, oho, oho, oho; kae pa mai lava ki te mea tena oi kai te atu, kua mau te atu. Ko te mea tena he mea moni lava, i ve ona lea atu au. Ko au, i na kupu na fakalogo au ki ei oi fano ai au oi tofotofu. Kafai e moni e talitonu au ki ei ma kō fakaaogā; e tautala atu ai foki au. Kae ko na mea e fai mai ki a te au, kae kikila atu au e he hako, ko na mea iena e he tokaga au ki ei; kae fai foki taku hukehukega ki ei. Tena la te mea moni e lea atu ai au.

3. E kehekehe na tulaga. Ia koe la na fakatamala. E togi atu lava, oi kai. Io! Ko tona uiga, ka vena lava. E togi atu, kai. E paku atu, kai. Ko te mea moni lava tena. Kae kafai e togi atu e he kai, kae toloheheu ake, oho, he kai; oho, he kai; oho, he kai; kae pa mai loa lava ki te mea e kai ai, oi kai. Ia koe lele la na toe fakatamala ai. E pa mai loa ki te mea tena, ia koe na he toe fakatamala, aua e i ei te tahi mea e ve. Kafai e heheu mai, oho, oho, oho, oho pa ai ki te taimi teia ka liliu ai te pa ka toe hahau, ko te taimi tena kua oho ai te atu. (Kua kai.) Ke manatua, ko te taimi la tena, ia koe nā fakatamala ai. E hau lava te pa oi pa ki te taimi teia ka liliu ai kae oho, kai; kae mea ake ko koe e loto noa. Ko te ala foki tena e he poa ai, ona e he maua te taimi e oho ai te atu.

4. Na fehili au ki te tino na fakaali mai te mea tenei, pe aihea kua ve ai ia atu? Ko te tali na kaumai ki a te au e veia. Kafai e tuku e koe te pa, kafai koe e kikila ki te pa, e hakili ai e lanu koe tona nanu, e veia ki te mālamalama o te lā, e fulifulu, fulifulu, fulifulu oi oho mai te nanu. Ko te pogai o te mea tena, kua taia te mālamalama o te pa. Ona pau lava, ko te kogamoana foki tena e taia ai te malamalama o te pa, ma e oho ai te nanu o te pa. Kafai e fulifulu, e ve ifo e he nanu. Toe milomilo ve ake; milomilo, milomilo oi oho mai te nanu. Io, ko te taimi tena. E pogai mai i te la. Ko te tali ia na kaumai ki a te au.

1. At the time when the skipjack bite you are still in the middle of a *tulaga*. *Tulaga* differ – in this way. In one sort of *tulaga* the lure is cast out, and trolled along, and [a fish] leaps! Caught! This means you should take care. That is the time that the skipjack bite. [The lure] just drops [onto the surface] and just like that, a bite! [The lure] just drops, and just like that, a bite!

2. Another sort of *tulaga* (among the different kinds that I am sure about). You cast out, troll, and there's a rise. Troll further, another rise. Troll still further, and still another rise. Pulled right in, and the lure is right opposite you on the starboard side, when there's a bite. The significance of that is that that is the very spot that skipjacks are biting. Take great care. You just cast out and a skipjack rises repeatedly until it gets to that place where they bite, and it is caught. That's the absolute truth, what I've just told you. My way, with things that I have heard about or tried out, is that if they are true I believe them and use them. And I tell others about them too. But to these things told to me which are untrue, I pay no attention. But I do some research on them, and what I have just told you is true.

3. *Tulaga* are different, one from another, so take care. You just throw [the line] out and it's taken. Yes, that means it will continue like that. Cast out and it's taken, as soon as it hits the water – truly. But at other times you throw out and there is no bite, and you drag the line along and there's a rise but no bite, another rise, and still another, but still no bite – until you get to that place where they do bite, and there's a bite. Be prepared. Once the lure gets to that place, be prepared because there will be another. When you are skipping the lure in there will be continual rises until there comes the time when the lure changes direction as you are about to make another cast. That's the time the skipjack bites. Watch for that moment, and be prepared. The lure comes in and in and eventually turns, and then the rise and the bite; but you are not paying attention. That's the reason for not getting the fish, simply not being aware of when it is going to bite.

4. I asked the person who told me about this why it was that skipjack behaved this way. His reply to this was as follows: Consider a lure. When you look at it, and seek its lustre, like rays of the sun, you turn it over and over, over and over until its lustre leaps forth. The reason then is that the brilliance of the lure was faded [drained away.] Nothing could be done about it, since in that particular spot in the sea the lure's brilliance was bleached until the lustre finally leapt from it. When you turn a lure over and over, from one angle there is no lustre. Twist it round a bit, and the lustre shines forth. Yes, that's the time. It's caused by the [position of] the sun. That's the explanation that was given to me.

The next section, 5-7, also deals with a matter of technique, in this case the direction of the strike to set the hook. The distinction between "forehand" and "backhand" strikes requires some clarification. The rod is usually held with a two-handed grip, with the left hand lower and acting as a pivot, the right hand several feet higher, controlling rod movement. Once a fisherman has cast his lure out astern he moves the rod round in an arc to starboard (his left side). The tip of the rod is in advance of the lure; the skipjack takes the lure from behind (or possibly from one side) and hence the necessity of making one's strike in the same forehand direction. If one were to strike with a backhand motion there would, as the speaker explains, of necessity be a moment when the line is slack, perhaps allowing the fish to escape. As in the passages on the lure's position relative to the sun, this section gives strictly practical justifications for matters of technique.

5. Oho te atu oi kai; fakalalau (fakanofu, i ta tatou kupu). E fakanofu ki fea? Ko ki tatou kua mahani i te uiga o na ika. Pe hīhī i ni hikaki pe ni kofe. E veia, ko te humu, e tualima. Ko te gatala, e tualima. E vena. E iloga lava te fakalalauga o te ika. Ko te humu, e lua ona fakalalau; e tualima pe hamu tonu. E pule la lava te tino i tana fakalalau. Kae ko au e he vēnā. E alolima taku fakalalau, pe ko te fakanofoga. E fakalalau lava e au te atu ki te mea e oho ki ei. E i ei foki te tahi taofi e veia, ko te fakalalauga o te atu pe ko te fakanofoga o te atu, ke kē iloa; aua ka halafaki te atu oi kai, e hula ki luga oi ino ai la ki lalo. Ko te tahi taofi tenei na fakalogo au ki ei; e fakatali la ke ino ki lalo te atu oi fakanofu ai. E fakatali koe ke kati te tai, aua la ke ke manatua ko te ohoakega o te atu e hula ki luga. Kafai e goto ki lalo kua kati te tai i te tua o te atu. Ia, ko te taimi tena, e kati te tai oi fakanofu loa. Pule mua te tino i te mea e ia faiagia; kae ko au lava tena.

5. The skipjack rises, and bites, and you strike. But in which direction do you make your strike [to set the hook]? We all know the ways of fish, and of fishing with both small and large rods. With *humu* (triggerfish), you strike backhand, with *gatala* (*Epinephelus merra*), you strike backhand. For each kind of fish there is a distinct way of striking. With *humu*, there are two ways of striking, backhand, or jerking straight toward you. People choose their own way of doing it. But I do neither of these. My strike is forehand. I strike in the direction that the skipjack is jumping. There is another opinion, which is like this, about the strike for skipjack – just so that you will know. When a skipjack rises up to bite it appears on the surface and then dives down head first. This is another view which I have heard, which is that one should thus wait until the skipjack dives before striking. You wait until the sea closes over the fish, because remember that when the skipjack rises up it breaks the surface. When it dives down, the surface of the water closes over its back, and that's the time to strike. A person may of course please himself just what he does, but that's my way.

6. E alolima taku fakanofu ki te atu. E fakalalau agai ki mua ki te mea e ino ki ei te atu, ma ko te fakalalau foki ia kua ko iloagia, e fai maua. E pule te tino. Kae tena te mea e ko takuatuagia, ko te mea kua ko mautinoa. E fakalalau ki te alolima. Ko au nae mahani foki i te mea tena; kae i ei foki ta tātou kupu veia, "Gauafoa". Ko tona uiga, ka fakalalau ake e koe ki te tualima ke kē manatua ko te atu e oho mai ki te lalo kofe. Kafai la e toe tualima ake e koe, ko te kupu te, gauafoa; ko te afo kua fenu. Tena la e i ei ta tatou kupu. Ko tona uiga e hē mālō.

6. My strike for skipjack is forehand, in the direction which the fish takes as it is going down, which I know is the kind of strike which really holds. Please yourself, but what I have told you is something I am certain of. Strike to the forehand. That was my way. There is also our word *gauafoa*, [used of a fishing line which goes slack]. The significance of this is if you strike upwards, or backhand, just remember that the skipjack is jumping toward you underneath the rod. If then you make a backhand movement, you will see the meaning of that word *gauafoa*. The leader goes slack, which is the meaning of our word, not taut.

7. Mātau ake e koutou. Ko ki tātou uma e hukehuke. Mātau ake te ika tenei ko te humu. Kafai e hahau atu nei, hau te humu; e kikila atu koe ka pa mai oi fakamalo te uka. E he mafai lele la ke pahala aua ko te humu he ika e mimiti vave oi pupuhi vave ki te mounu. Kafai la e fenu te uka, e fiu koe; e fakalalau, tiaki; oi fakalalau tiaki. E vena. I taku hukehukega la, ko te atu e vena foki. E he toe tualimagia aua e kino e gauafoa; e fenu te afo. Ke manatua ko tau hamu e fano ki te tualima, kae ko te atu teia e oho mai ki te lalo-kofe. Teia e i ei toku malamalama, e he toe tualimagia te fakanofoga o te atu kae alolima, ki te mea lava e mālō ai pea te afo. E he mafai ke fai tiaki ia atu.

7. Take note. We are all researching this. Note what takes place in fishing for *humu*. When you cast out, and a *humu* approaches, you see that the line is taut when it gets to the bait. You can't make a mistake about this, because the *humu* is a fish which nibbles very quickly and can then just as quickly spit the bait out. If your line is slack at this time, you will be discouraged; you strike and it gets away, strike again and again the fish escapes. Its like that. In my view, skipjack are also like that. Don't move in the backhand direction lest you cause *gauafoa* with the leader going slack. Remember to make your strike forehand while the skipjack is jumping toward you underneath the rod. That is my understanding, don't move backhand to strike, but to the forehand, in the direction which keeps the leader taut. In that way the skipjack can't get off.

The final passages, 8 through 18, move beyond matters of technique into the field of skipjack behaviour and reproductive biology. They also illustrate some of the most important social relationships which obtain between men involved in skipjack fishing.

The previous sections, dealing with wholly technical matters, contain none of the standard Tokelau phrases indicating respect and deference. Passage 8, however, opens with just such a phrase, as if to indicate that important social relationships are involved, and the speaker shifts to a deferential stance in relation to other *tautai* in his (imaginary) audience. In discussions among Tokelau men many of the most important and telling points are made with disclaimers as to their weight and importance – as though they were simply matters to be “mentioned merely in passing”. These final passages also point up the centralised control which prevails during skipjack fishing expeditions, with all information channelled back to the elders on shore, whose prerogative it is to decide on strategy and to direct operations. Hence the emphasis upon precise reporting of relevant information.

Passages 12 and 13, besides containing information on the relevant details to observe, also illustrate some points of etiquette between men. Every skipjack expedition is placed very clearly under the direction of a single *tautai*, usually the oldest one at sea on the particular day. In these circumstances it would be considered impolite and disrespectful for any other man, *tautai* or not, to tell the leader that he should have a look at the roes of fish which had been caught. Hence the suggestion that some skipjack be cut up for food, indirectly allowing for an examination of the roes.

We cannot, unfortunately, comment at all on the accuracy of the predictions about schooling behaviour which Peato makes from the different stages of gonad development. It is, however, well known among Tokelau fishermen that the gonads do change and mature over the period that they can be observed. Gillet (1985) recorded this same information from Tokelau recently, pointing out that two stages of development of the female gonads were recognised (“immature” and “mature/ripe”) and that these can be fitted in with the five stages recognised by Argue (1982). Peato delineates three stages, each of which is described quite precisely. He also makes interesting observations about the progression of *laga*, a term which refers to the different kinds of skipjack schooling behaviour and the subtle surface signs, many barely perceptible to an untrained eye, indicating the presence of a school. Gillet (1985) also gives a typical progression of named *laga*, which is not identical with that given by Peato, and speculates on the possibility that the *fakapula* type, known to Western fishermen as a “white spot” school, may in fact be spawning schools, still little known to fishery scientists. Peato’s final *laga*, “when the fish glide smoothly along near the tops of the swells with their bodies sort of reddish”, may also be related in some way to these scientific observations, but we cannot say how.

The final passage 18 has a subtlety and rhetorical power which is difficult to convey in translation. It shows Peato as a consummate Tokelau elder – an orator, preacher and moralist, humbly acknowledging his ignorance about things lying outside of his experience and observation, but secure in the certainty that God’s good design lies behind all things.

8. Fakamolemole mua ia tautai, kae ko au ka tautala atu ki te matakupu tenei e uiga ki na kupu o te Tuākau, e tuha ma te va o koe ma toeaina. Ko koe te tautai e mahani i tuākau. Pe hea la ni au kikilaga ma ni au hukehukega, ma ni au lipoti e kave ki gauta i na toeaina. Fakamolemole ko au ka tautala tahi atu i te mea teia.

8. With apologies to the *tautai*, I shall now talk about a piece of ocean lore concerning your relationship with the elders. You are a *tautai*, familiar with the open sea. What, though, should you take note of, what should you study in order to report back to the elders on shore? Excuse me, but I shall just mention this matter.

9. Kafai he aho kua lalaga te taumanu oi fano ai he vaka oi alo; kua hi ia atu. Kafai e hi mai ia atu kae kikila ifo koe ko te tino o te atu e gahелеhele, ma te tahi fakailoga, e faki ifo loa lava te atu, paku ki te liu oi tatapa loa (tafiti loa) ni fakailoga iena e tatau ona ke fakamāuagia e tuha ma tau lipoti ka kave ki gauta ki toeaina pe kafai kua maua ni taki heaoa i te aho tena. Kafai koe e kikila ifo ki te tino o atu e i ei na uiga iena, e gahелеhele ma te paku loa oi tafiti loa, kikila ake, e hē he taumanu. Kae kafai e fehili atu na toeaina, “He a tau kikila ki na atu kua kaumai nei?” E mafai koe ona tali ve atu ki ei, “Kikila! Ko na mea galigalimau lava o te utua. Tena e gahелеhele ai, aua e lalaga i aho uma, aho uma.” E mafai foki ona ke fakaaogagia te kupu tenei, “Ni atu gauta.” E kē kitea ifo lava e gahелеhele ma te mea lava tena, e tafiti. Kafai la e fehili atu na toeaina, “He a la kua kaumai ai he taki heaoa kafai ni

9. Suppose one day a flock of feeding seabirds appears and a canoe goes out. Skipjack are caught. When skipjack are caught look to see if their bodies are cut and scratched all over, and as another piece of evidence note if when they are detached from the hook and fall into the bilge water, they start trembling and shaking and jumping round. These are signs which you should note for reporting to the elders on shore once you have all got your couple of fish for the day. When you look at the skipjacks’ bodies and see that they are that way, scratched, and that when landed they immediately start jumping round, you know they are not from a skipjack school. So when the elders ask you “What’s your view on these skipjacks you have brought back?”, you can reply as follows, “Look, these are just regular inhabitants of the reef point. That’s why they are all scratched because they have been rising and feeding day

atu gauta?" Ko tau tali e fai ki ei e ve, "Mahalo lava ni halaga e o te mafua kua hala ake ki gauta i te aho tena." Pe ni halaga e o te mafua kua fanake ki gauta.

10. Ko te tahi mea kua ki tatou mautinoagia, he mafua kua lafi ake ki he otaota. Pe ni launiu, pe ni polapola otaota. E mahani te mafua oi malu ki ei kafai e kai e ni ika, oi tafea ake ai lava na mea iena. Kua fia foki ia mea vena e maua ai ia atu e ni tino. Ko te mafua e lafi ki ni launiu, pe ni kaulama e tafefa, ko atu foki e takamilo ai ki te mea tena. Kua fai ho e ki tatou te mea tena. Kua hi ia atu, pe taki tinoagafulu pe ko te tai-tinolua. Ni halaga lā vĕnā. Ko tau tali la, "Mahalo ni halaga e o he mafua kua hala ake ki gauta."

11. Kae kafai e hi mai e koe na atu e gigila o latou tino, ma paku ifo ki loto i te vaka oi fakalologo kae fatoa tafiti lele mulimuli, fakamolemole, taofi na mea iena. Kua kē iloagia kua ni fakailoga e ō he tai-atu kua ake mai. Taofi na mea iena ke fai ma au lipoti ki toeaina i gauta. Kae tahi la te mea e vave ona fakamaonia i na fakailoga iena. Kafai e gigila na tino o na atu ko tona uiga ni atu fou, ma te paku ifo ki loto i te vaka e he tafiti, ko tona uiga e fekai ki te pa (tana mafua); ma te mea tena, fatoa tafiti lele mulimuli.

12. Kae tahi te mea, e heki fakamaonia. Fakatali aua e i ei te mea i loto i te atu e tatau ona maua ai e koe te fakamaoniga. Kafai kua maua he tonu i na tautai matutua, ka kavake ki te malae, kua ke iloagia ai kua heai hau togatifi e ke iloa ai he fakamaoniga i loto i te atu. E mafai la ona fakaali ho taofi veia ki te toeaina matua, "E! Fakafiafia atu ko te faoa ke hele ni atu ke ota." E he ko koe e fia ota. Kae ko koe e i ei te mea e fia hukehuke koe ki ei i te tino o te atu. E kē mautinoa ai pe he taumanu fou, pe he taumanu fatoa ake mai, pe he taumanu foki kua loaloa te fai i moana mamao kae fatoa ake mai.

13. Kafai la e hele ni atu, ko te kupu a koe te tautai e ve atu, "Kaumai ko la na tama ma aku." E he ko koe e fia ota ki te tama, kae ko koe e fia hukehuke ki te tama, e tuha ma na fakailoga e lua ieia kua ke iloa muamua.

14. Kafai e kaumai ki a te koe te tama, kae fatoa fakakau, ko tona uiga he tai-atu fatoa kamata. He tai-atu foki fatoa ake mai. Kafai e kaumai ki a te koe te

after day. You can also put it this way, "Inshore skipjack". You look and see they are scratched and also they're jumping round. If though the elders were to then ask you, "Why though have you each brought back only a couple if they are inshore skipjack?" What you should reply is, "Maybe some strays from the school of bait fish that day, and which have wandered inshore", or, "after some bait fish which strayed inshore".

10. Another thing which we know about is that they may be after bait fish which came here with floating rubbish, such as a coconut frond or baskets of trash tipped into the sea. Baitfish will normally seek such shelter if attacked by larger fish, and drift along with it. How many times have people caught skipjack from these circumstances. The bait fish shelter among the coconut fronds, either green or dry, which are drifting, and the skipjack circle round and round. We have all seen it often, and have caught 10 or perhaps 20 skipjack. Strays of that sort. So your reply should be, "Perhaps some strays from the bait fish which have drifted inshore".

11. But if you land skipjack which have glistening bodies, and which when they drop into the bottom of the canoe just lie there quietly and then only start jumping round much later, do please take note of that. You will know that as signs of a skipjack school which has only newly formed. Remember those points to report to the elders on shore. There is but one thing that these signs point to. If the skipjack bodies are glistening that means they are young fish, and when they drop into the canoe and don't jump around that means they are still fiercely excited by the lure. And then only later do they jump around.

12. One thing, though, is still not proven. Just wait, because there is a thing inside the skipjack from which you should get proof. If the older *tautai* make a decision to take all the fish to the *malae* [for distribution to the village] then you know that there is no way you can examine the evidence that is inside the skipjack. You can, though, let your opinion be known to the old *tautai* in this way, by saying "Hey! Make the crew happy by letting them cut up some skipjack to eat raw." It's not that you want to eat the fish, but just that you have this thing which you want to examine inside the skipjack's body. You will then be certain whether it's a newly-formed school, or a school which has just newly arrived [from elsewhere], or even a school formed a long while ago in faraway seas and which has just come.

13. When some skipjack are cut open, you, the *tautai*, should say, "Just give me some of the roe". It's not that you want to eat the roe, but just that you need to examine it, with reference to the two signs which you noticed previously.

14. If the roe is brought to you and it is newly-formed, that means that the school has only just formed. It is also a school which has just come

tama, e kikila atu koe kua tama moto (e paepae mama lelei), oi tago oi kati. Kafai e kati atu kae huavaia, he tai-atu tena. Ko te fakailoga tena o te tai-atu fou fatoa hau.

15. Ko te fakahologa tenei e ke iloa ai ko te tai-atu ka uma. E pa foki ki te mea tenei, ka ke iloagia ai ia laga a atu ka fuli, mai tau hukehukega lava i loto i na tama.

16. Kaumai ai te tama. E kikila atu koe e veia kua tai kili memea. E kati te mea tena. Tago lava koe oi kati. E ke lagona atu e huavaia ka kua i ei na mea e ve e potopoto i loto i te tama tena e kati, kae ke kitea foki ki te tua o te tama, e veia kua i ei ni hele e lanu kehe ake ai. Fufulu ake la te tahi itu o te tama, e kikila ifo koe ki ei, kua i ei na hele iena i te itu ki lalo o te tama. Kua i ei foki na hele ve ni mea kua kulakula, e veia ni uaua kukula. Ko tona uiga, he tai-atu lava; ka ko te mea la kua fakaholo ka uma, mai te fakailoga tena. Kae kafai e kaumai na tama e kikila ifo koe kua tama pula, e kati foki. Tago foki oi kati. Kafai e fakapapa atu na fua i loto kae fakapapa-gofie, he tai-atu lava; kae tahi te mea kua fakaaau atu lava ka uma.

17. Kafai foki e kaumai kae ni tama matua, e kati lava. Kafai e fakapapa atu e koe kua makeke, kua ke iloagia lava kua gaholo lava. Ko taimi foki tena kua ke iloa ai, ma fakaaoga ai e koe te kupu teia, "Ko atu ka tau-tuku-fano." Ko te taimi foki tena, fuli loa ia laga a atu. Kua ke iloagia ko laga a atu ka fuli; i te mea tenei, ka fakalelei, taka fakauli, fakapula, ma te fakaliki. Ko na laga iena ka fai. Ko atu ka fuli, aua ko atu ka tau-tuku-fano. E ke iloagia ai foki toe tahi te laga koi totoe i na mea iena. Ko te laga tena e fakahekeheke i luga o na ulu-peau kae kua fakakukula o latou tino. Ko te laga tena ko tona uiga, ko atu kua tukufano. Ko tona uiga pe toe lua pe toe tolu ia aho kae uma te tai-ika. Kua uma; e he toe lalaga aua kua olo.

18. Kua olo ki fea? Kae ko ai foki ko te iloa ia vae o ika! Kae ko te kupu lava na ko lagonagia, kua olo ki gatai i tua atu lava o palega (ki moana vavaloloa). E ve lava ona ki tatou iloa te kupu palega, ko te kogamoana tena e heai ai ni faiva e fai ai aua e heai ni ika. Ko tona uiga kua olo ia atu ki kina oi tukufua ai (fananaui ai). E ve lava ona ki tatou lagona, na tuku mai e te Atua ki te tagata, e alofa ma hakili e ia he mea lelei ke fanau ai ana tama. E muhu ka tauale. E vena lava ia ika o te tai. E tutuha lelei lele ma te tagata.

inshore. If, when the roe is brought to you, you see that it is immature (a good clear white) take it and bite it. If when you bite it, it is watery, then there is a school. It's a sign of a newly-formed school which has just come.

15. By this procedure you will [also] know that the school is about to end. It is by this same thing that you will learn that the *laga* is about to change – from your examination of the inside of the roe.

16. Get the roe. You look at it and see that it is sort of golden skinned. Bite it. Take hold of it and bite. You feel that it is watery but with clots in it, and when you look at the top of the roe sac you see that there are stripes of a different colour on it. Turn it over to the other side and you will see those stripes on the lower side. There are also some stripes almost reddish in colour, like red veins. This means that it is a real school, but it is getting on toward the end. When, however, the roe is brought and you see that it is ripe, bite it too. Grab it and bite. If the eggs inside burst out readily, it is indeed a school, but also one that is getting on toward its end.

17. Again, if fully mature roe is brought, bite it also. If when it bursts it is hard, you know it is right up to the point. You know it right at the time and you can say, "the skipjack are at the point of departure". It is also at this time that the *laga* change. You know that the *laga* will change as follows, to *fakalelei, taka fakauli, fakapula and fakaliki*. Those are the ones. The skipjack change [their behaviour] because they are about to depart. You will also know from this that there is only one *laga* left, which is when the fish glide smoothly along near the tops of the swells with their bodies sort of reddish. This sort of *laga* means that the skipjack are departing and that in two or three days the season will be over. Finished, with no more *laga*, because they are gone.

18. Where have they gone? Who is there, after all, who knows about the wanderings of fish? What I have heard said is that they go off out to sea, beyond *palega*, to the open ocean. As we know, *palega* refers to that part of the sea where no fishing is done, because there are no fish. The skipjack go there to lay their eggs (to give birth). As we all know, it was ordained by God that mankind should love and then seek a suitable place to bear children, avoiding sickness [and misfortune]. It is the same with the fishes of the sea. Exactly as with people.

NOTE

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AN INTERSECTORAL APPROACH

TO HEALTH AND DISEASE:

A case study from Fenuafala

Fakaofu, Tokelau Islands

September, 1987

Moshe Rapaport

Abstract

A small village of thirty-two households was surveyed on Fenuafala, Fakaofo, Tokelau Islands. The object was to study intersectoral aspects of health on a coral atoll community that was still semi-traditional. Although meaningful comparative rates for fertility and mortality are elusive in this small population, it is clear that there is a high birth rate, a low death rate, and continuing migration to New Zealand and Samoa. Alcohol is a significant cause of social discord. Tobacco consumption and obesity are major health risks. There are no apparent neurotic problems but there are difficulties in communication between family members. Tropical infectious disease is not problematic; but chronic diseases are reportedly becoming increasingly prevalent. Musculoskeletal disorders are prominent among women while serious injuries are common with men. In both sexes there is an unusually high rate of epilepsy. Other problems include skin infections, gastroenteritis, and upper respiratory infections. The health care delivery system is hampered by difficulties related to transportation and shortage of medical supplies but there is an adequate amount of well trained personnel. Traditional practitioners are still widely consulted for practically any kind of problem. A variety of social problems are expected along with the eminent breakup of the extended family system. The introduction of a western style bureaucracy threatens to replace community solidarity with the individualism of a wage economy.

Tokelauan Song

Agi malu mai kote Tokelau
Ke momoli ai taku fekau
Ni Alofaga ki a te koe toku au
E he puli koe i toku mafaufau.

Toku fenua e nae rofo ai aua e
He fenua toka malie
E he mafai ona puli koe
Fakaofa toku laumua pele.

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Introduction

Development planners in the international field have been hindered as much by conceptual confusion and rapid "about-faces" in ideology as by the not insignificant difficulties posed by rapidly growing populations and limited and often diminishing resources (1). Health planning in particular has suffered because of the assumption that economic development is more important initially than improvement of health conditions and social welfare (Berg, 1973; Reutlinger and Selowsky, 1976). When it became evident that in spite of promotion of industrial growth and increasing GNP, many people, particularly in rural areas remained without adequate social services, there was a move towards "development with equity". Along with programs for land reform and agricultural development came the emphasis by the World Health Organization on "primary health care", which proposed to aim for health for all by the year 2000.

Because of the limitations of personnel and resources, many countries advocated a "basic needs approach" giving first priority to education, safe water supplies and sanitation, and adequate nutrition and housing. However, it is obvious that no single formula can be applied to any one country, or even any district within one country. The need for an interdisciplinary approach, then, to study and research health problems in relation to development, is apparent. Although it is impossible to study each and every society at the microscale, research at this level is useful because the subject of study is small enough to apply the kind of comprehensive approach that would be formidable (and with questionably significant results) at the macroscale.

This survey of the village of Tai on Fenuafala in the Tokelau Islands (maps 1-4) was conducted during July-August, 1987 as partial fulfillment of the requirements for a master's degree in public health at the University of Hawaii at Manoa. Together with the medical officer and a research assistant, I attempted to study a small community in the Pacific Islands at the microscale. The aim of this survey was to study the social and medical conditions on a Polynesian coral atoll and to unravel causal linkages with the natural environment and the political situation. It attempts to treat health and disease problems in terms of systems and relationships rather than isolated phenomena. It does this by combining a human ecological perspective with an analysis of the historical processes which have shaped the social and political dynamics of Tokelau.

Tokelau is the site of one of the most extensive medical surveys in the Pacific Islands. A health survey in 1963 (Elliott, 1963) defined a number of important public health and medical problems, including water shortage, a high incidence of skin disorders, and heavy infestation with the Polynesian rat (2). In 1966, following the establishment of a planned migration program to New Zealand, the Wellington Hospital Epidemiology Unit, directed by I. Prior set up the Tokelau Island Migrant Study. The unit has carried out surveys of Tokelau in 1968, 1971, and 1976 in collaboration with the Tokelauan communities and the medical officers. The team examined blood pressures, weights, and diabetic status, and carried out mantoux testing, BCG administration, polio vaccine administration, and collection of smears for microfilaria examination. Tokelauans

migrating to New Zealand were also examined during two major rounds in 1972/1974 and 1975/1977 (Prior and Stanhope, 1980). A summary of the findings of the Tokelau Island Migrant Study is provided by Prior (1979) and Stanhope, Prior, and Fleming (1979).

The present study differs in both approach and scope from previous studies. It does not attempt to replicate the extensive epidemiological surveys which have already been done, and are still in progress. It attempts to throw some light on the intersectoral dynamics of some of the public health problems in Tokelau using a multidimensional perspective. It may therefore be appropriate to give a brief, preliminary historical and geographical background of the region studied.

Regional Description

The Pacific Islands are exceptional in terms of their isolation and small size when compared to most countries (Alkire, 1978). Tokelau is among the tiniest and most remote of these groups, and has a relatively traditional lifestyle. However, even as this paper is being written, the society is undergoing some dramatic changes (See discussion).

Tokelau is a group of three atolls 400 kilometers north of Western Samoa and is administered by New Zealand. It is part of a "belt" of atolls which extends from the Palau through the F.S.M. and turning southwards through Kiribati and Tuvalu before turning east again and encompassing the northern Cook Islands and the Tuamotus (map 1). The traditional evidence for the peopling of the atolls is both fragmentary and contradictory. One group of traditions ascribes the origins of the Tokelau people to settlers from Samoa (Newell, 1895), Rarotonga (Burrows, 1923), or Tuvalu (Powell, 1871) while another describes an autochthonous origin (Macgregor, 1937) (3).

Both linguistic evidence (Table 1), studies of social structure (Figure 1), and archaeological evidence (Kirch, 1986) demonstrate that they are closely related to Tuvaluans, Uveans (Wallis Is.), Futurians, Pukapukans (Northern Cook Is.), and the Western Polynesian outlier islanders. One informant claimed that Tikopia (Solomon Is.) was populated by people from Atafu some 10 generations ago after being driven out by a war party from Fakaofu (4).

Map 1. The Pacific Islands

Source: Stanburg and Bushell (1984)

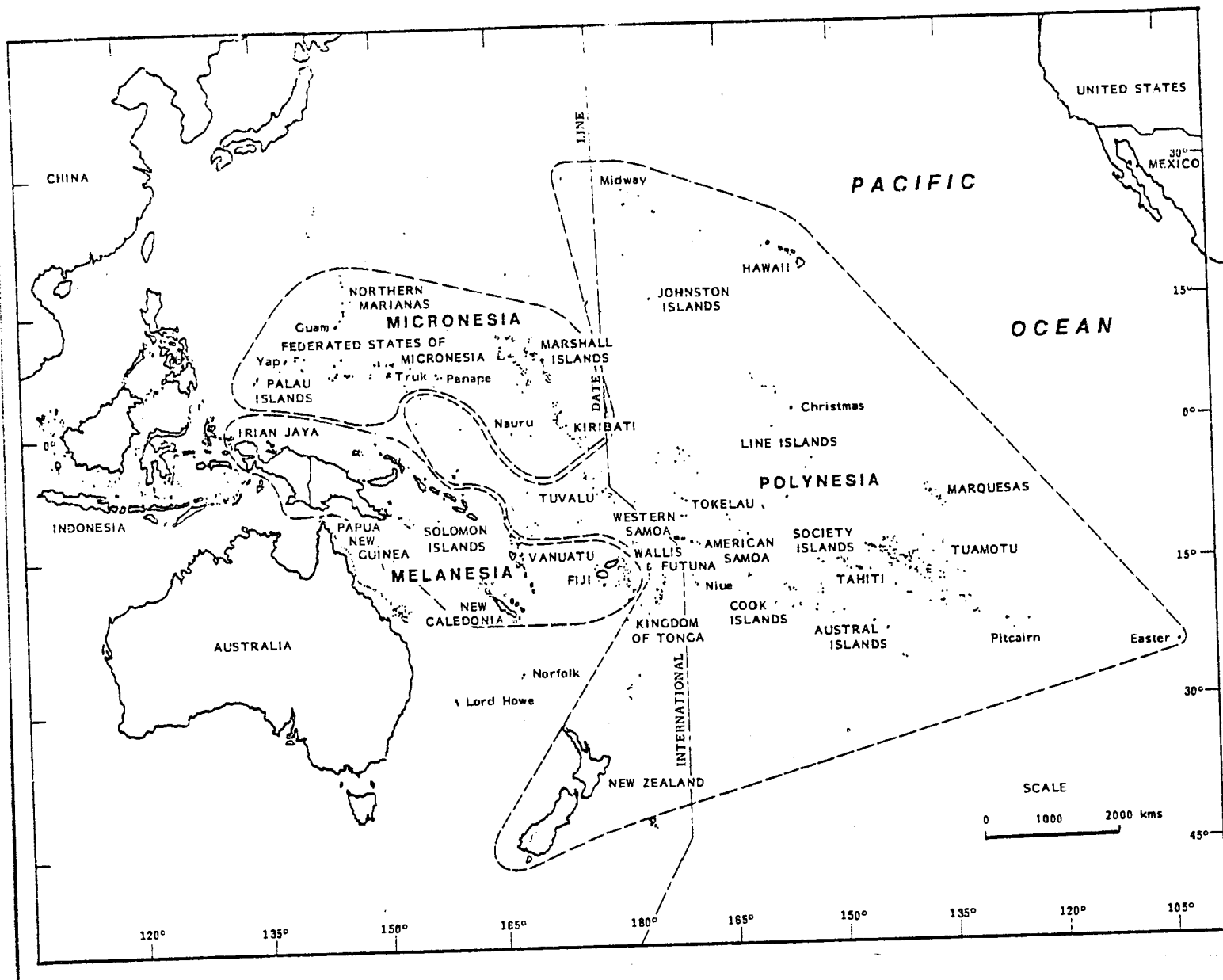


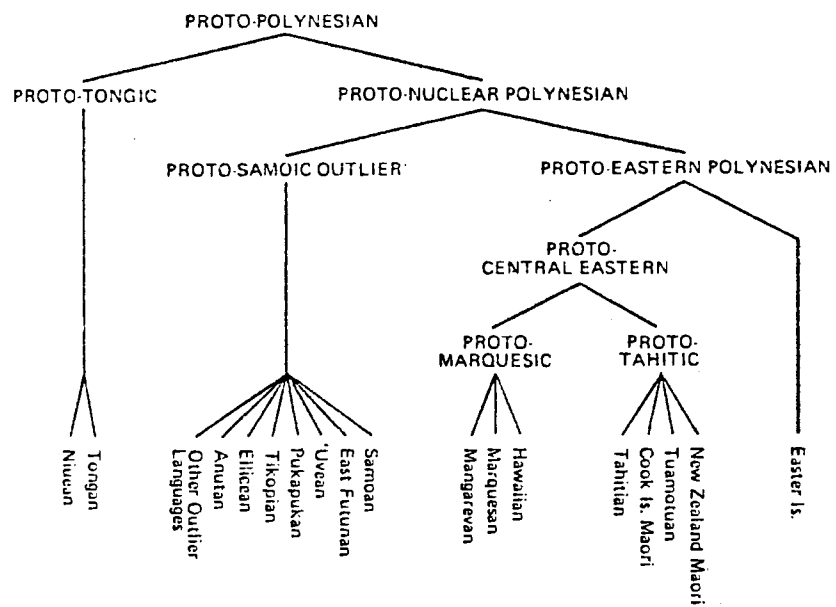
Table 1. Social Stratification in Polynesian Societies

Source: Kirch (1986)

Island group	Approx. population of largest political unit	Degree of stratification	
		Sahlins	Goldman
Tonga	40,000	I	stratified
Hawai'i	30,000	I	stratified
Society Is.	9,000	I	stratified
Samoa	25,000	I	open
Mangareva	4,000	IIA	stratified
Easter Is.	3,500	IIA	open
Mangaia	3,000	IIA	open
Marquesas Is.	1,500	II B	open
Niue	4,500	—	open
'Uvea	4,000	IIA	traditional
Maori (N.Z.)	3,500	—	traditional
Tongareva	2,000	—	traditional
Tikopia	1,250	II B	traditional
Futuna	2,000	II B	traditional
Pukapuka	500	III	traditional
Ontong-Java	2,000	III	traditional
Tokelau	500	III	traditional

Figure 1. Polynesian Language Groups

Source: Kirch (1986)



Sporadic contacts by whalers and exploring expeditions were made during the eighteenth and nineteenth centuries. Following a severe hurricane in 1846 that brought widespread famine to the islands, a large part of the population migrated to Uvea. Visits were made by both Catholic missionaries and the London Missionary Society. These were followed by a serious epidemic of dysentery and later by visits of Peruvian blackbirders. By 1863, the population had been reduced to 200 from a previous estimate of 530 (Hooper and Huntsman, 1974). The shocks posed by these overwhelming disasters may have set the scene for the disintegration of the traditional religion in favor of Christianity (5). Tokelau became a British protectorate in 1877. European traders and adventurers immigrated to the islands over the next generation, leaving children of mixed ancestry on all three atolls. Some of them can be credited for establishing the market sector of the Tokelauan economy, though this remained small and marginal to the mainstream of Tokelauan life during the nineteenth century.

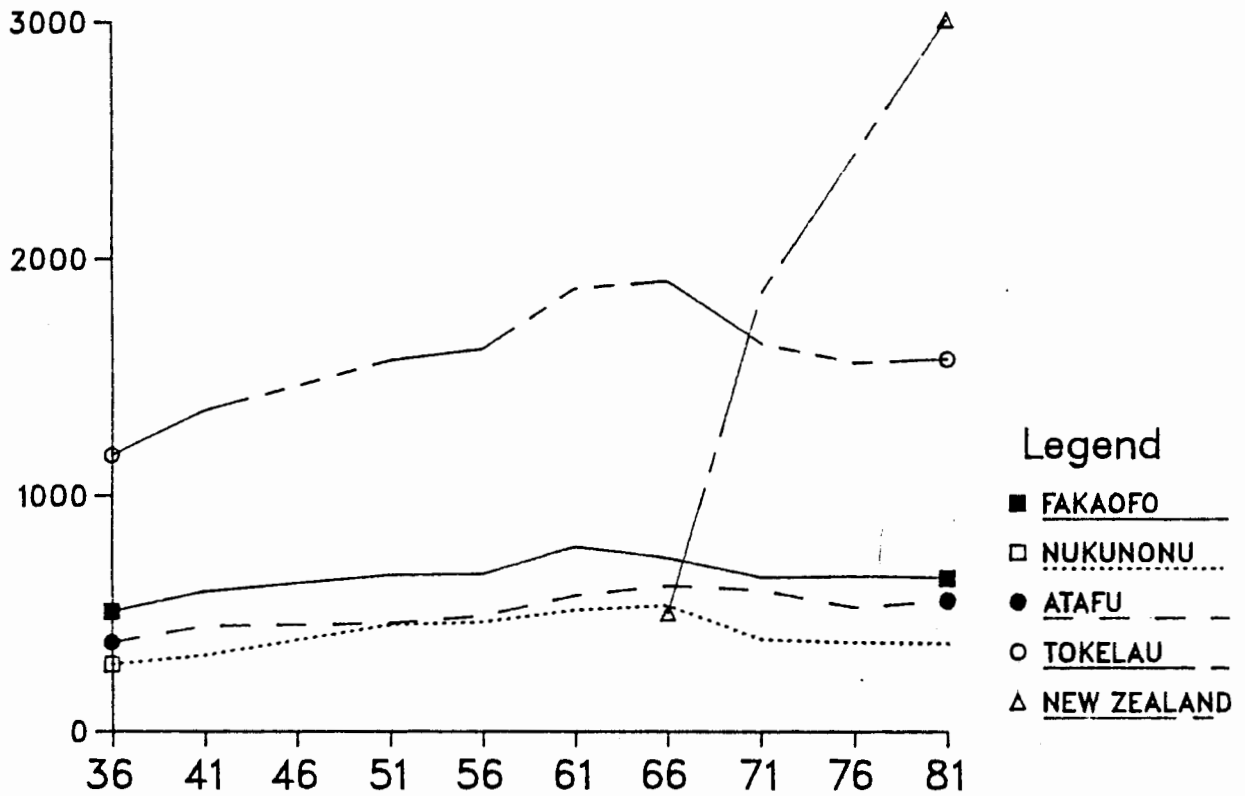
Hooper and Huntsman (1974) report a number of distinct stages in the overall pattern of population growth. The first, from 1863 through the early 1900s is characterized by immigration, very little emigration, and a high rate of growth. Then developing contacts with Olusega and Samoa led to labor migration which effectively reduced the overall rate of growth for the next 25 years. The third period began with New Zealand control over the islands in 1926 and lasted until the 1950s. This was a period of steadily rising growth rates, attributed to administrative control over emigration, the depression, the war, and improvement in medical services.

Each of the atolls reached its highest ever population during the 1960s and each population has been structurally modified by emigration. This followed an ambitious resettlement program by the New Zealand government. At first, single males and females (mostly between the ages 20 and 30) were targetted (1963-67). In 1967, the Government began sponsoring families (including old people) in preference to single persons. The total number of government-sponsored migrants up to March, 1971 was 356. This included 118 single persons brought for wage employment, 35 for school and training, and 41 families (82 adults, 136 children, and 20 grandparents). The scheme also prompted a good deal of privately sponsored migration from both the atolls and the Tokelauan minority in Western Samoa, so that by 1971 there were 1848 Tokelauans and part Tokelauans in New Zealand. In 1975, concerned by the loss of manpower, the island communities recommended that the resettlement scheme stop, and that subsequent migration should be "dependent on family resources and desires". In spite of high birth rates, migration has been declining since 1967, leaving a population characterized by a doubling of the dependency ratio for both children and old people. Today there are more Tokelauans in New Zealand than in Tokelau, a finding which is not unusual in the region (Cooks, Niue, American Samoa).

The demographic changes over the last five decades are summarized graphically in figure 2. The population reached its peak in 1963 (not shown on the graph), subsequently declined with emigration to New Zealand, and levelled off at around 1971-76 corresponding with the

Figure 2. Demographic Changes in Tokelau and New Zealand

Source: Hooper and Huntsman (1974), Prior and Stanhope (1980), Pacific Island Yearbook (1984)



ending of the resettlement scheme. The disproportionately high increase of Tokelauans in New Zealand is exaggerated because it also includes part Tokelauans (a very large part of the community in New Zealand married Samoans, other Pacific Islanders, and New Zealanders). However, it does show the high rate of emigration from Tokelau (beginning from an assumed figure of less than 500 in 1966). It also demonstrates that the highest rates of migration began first in Fakaofo (1961), secondly in Nukunonu (1966), and lastly in Atafu (1971). Milestone events which were important in the migration pattern are summarized in table 2.

Table 2. Post-colonial Demographic Events in Tokelau

Source: Compiled from data in Hooper and Huntsman (1974), Stanhope et al (1979), and Prior and Stanhope (1980)

1926-36	Estimated growth rate: 1.24%
1945-51	Estimated growth rate: 2.06%
1955-60	Tokelauan population in Western Samoa at peak (500)
1962	Western Samoa independant
1963	Ten Tokelauan girls sent to New Zealand
1966	Severe hurricane damage in Tokelau; resettlement scheme
1963-68	Estimated growth rate: -1.5%
1966-72	456 govt. assisted Tokealuans emigrated to N.Z.
1975	Resettlement scheme ended at request of island communities
1971-76	Estimated growth rate: -0.9%

Hooper and Huntsman provide some of the available data on vital statistics (by atoll) in Tokelau. In Fakaofu, forty-one births are reported in a two year interval between 1967-69. Thirty-three deaths are reported in the six year interval from 1964-70. The population declined by eighty-one from the year 1966 to 1971. A decline of this magnitude in the face of high birth rates and low death rates is explained by the high rate of migration to New Zealand. At present, the rate of emigration continues at a lesser rate, thus maintaining a relatively level population in Tokelau (although with a disproportionate age and sex structure, as mentioned above).

Since 1948 Tokelauans have been considered full New Zealand citizens. The economy is largely subsidized by direct aid from the New Zealand government. In 1987 this amounted to 3.5 million N.Z. out of a total budget of 4.5 million N.Z. (6). A major part of the budget (25%) is spent on education. The remainder is about equally divided between administration, public works, agriculture and fisheries, transport and communications, and health (Office of Tokelau Affairs, 1987). Because of the economic aid and privileges afforded by New Zealand and the limited land and resources on the islands, Tokelauans have been extremely reluctant to become independent. The islands are officially governed by an administrator in Wellington, but, in fact, the islanders are self governing. The toeaina (the elders) on each island meet weekly in a fono (council) on a variety of social and economic issues. Inter-atoll meetings on these and political issues are held several times per year. The councils regulate village law, decide how the budget is to be allocated, and direct the required communal labor

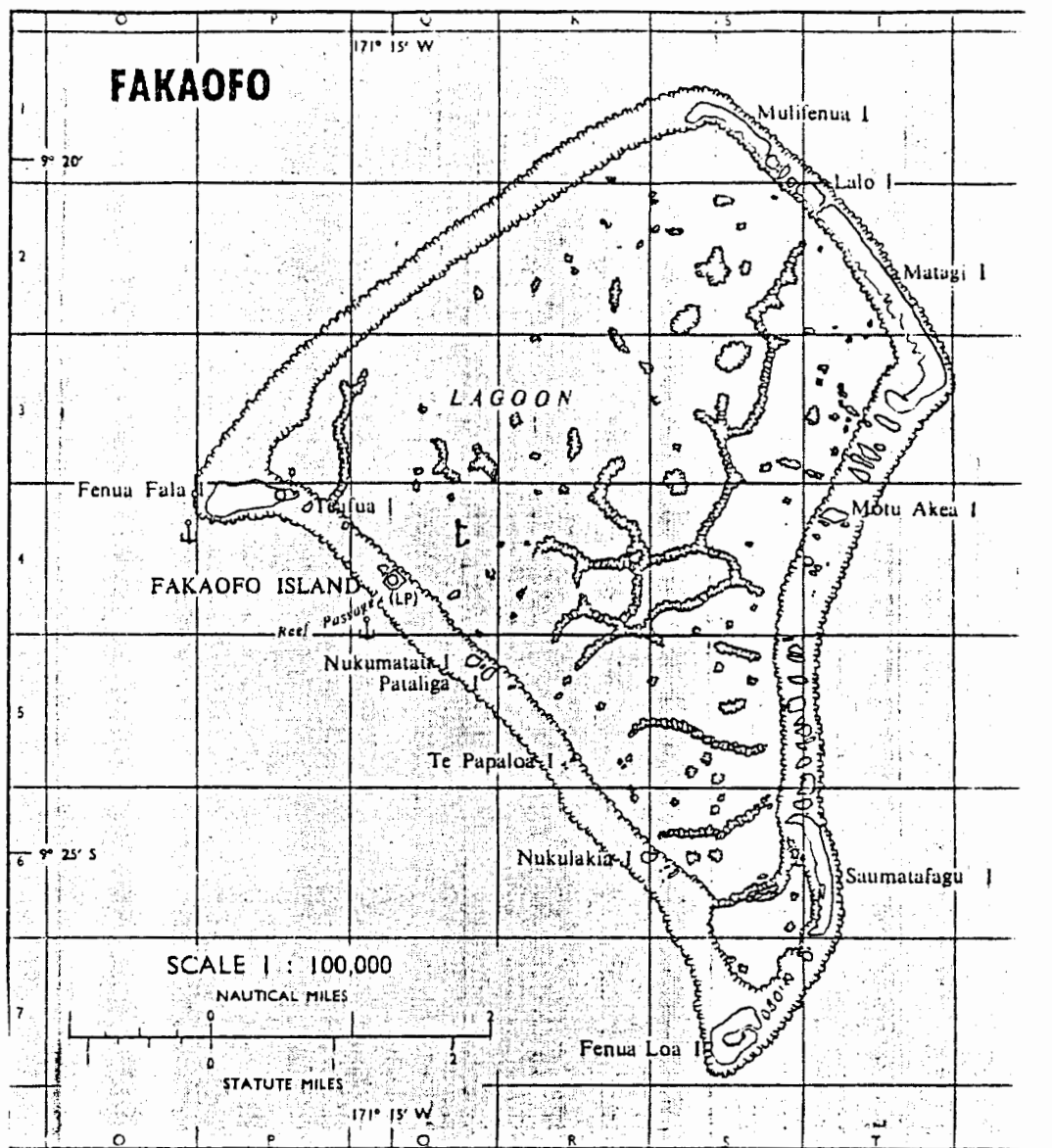
on a daily basis. There is considerable tension in the traditional government because of the threat posed by a system of public service introduced by New Zealand in recent decades. This system, subsidized by New Zealand aid, employs about a third of the available adult labor on the islands and does not easily fit into the norms of traditional Tokelauan society.

The atolls of Fakaofu, Nukunono, and Atafu are small (7). Land areas range from about 600 to 1000 acres (on each atoll) and the diameter of the lagoons range from 3 kms. (Atafu) to 7kms. (Nukunono). There are no deep water passes into the lagoons and cargo must be transferred to small boats through natural channels to the island or into the lagoon during high tide. The motus making up each atoll vary in size from a few square yards to 4 miles in length. None are more than 15 feet above sea level. On each atoll (except Fakaofu), the population is concentrated into a single village on a motu (islet) close to a small natural passage that allows canoes and boats to move between the lagoon and the sea. The villages are on the western, leeward side of the atoll. Fakaofu, the southernmost atoll (map 2), has about 60 motus, and is the only atoll with more than one village. The second village was built in 1960 on Fenuafala, a neighboring motu, when the main village, Fale, became overcrowded (map 3).

Vegetation is dominated by the coconut palm and a number of other important trees including pandanus (used for thatching, mats, handicrafts, and fruit) and hardwood species (for building canoes household items). A variety of wild fruit and edible greens is

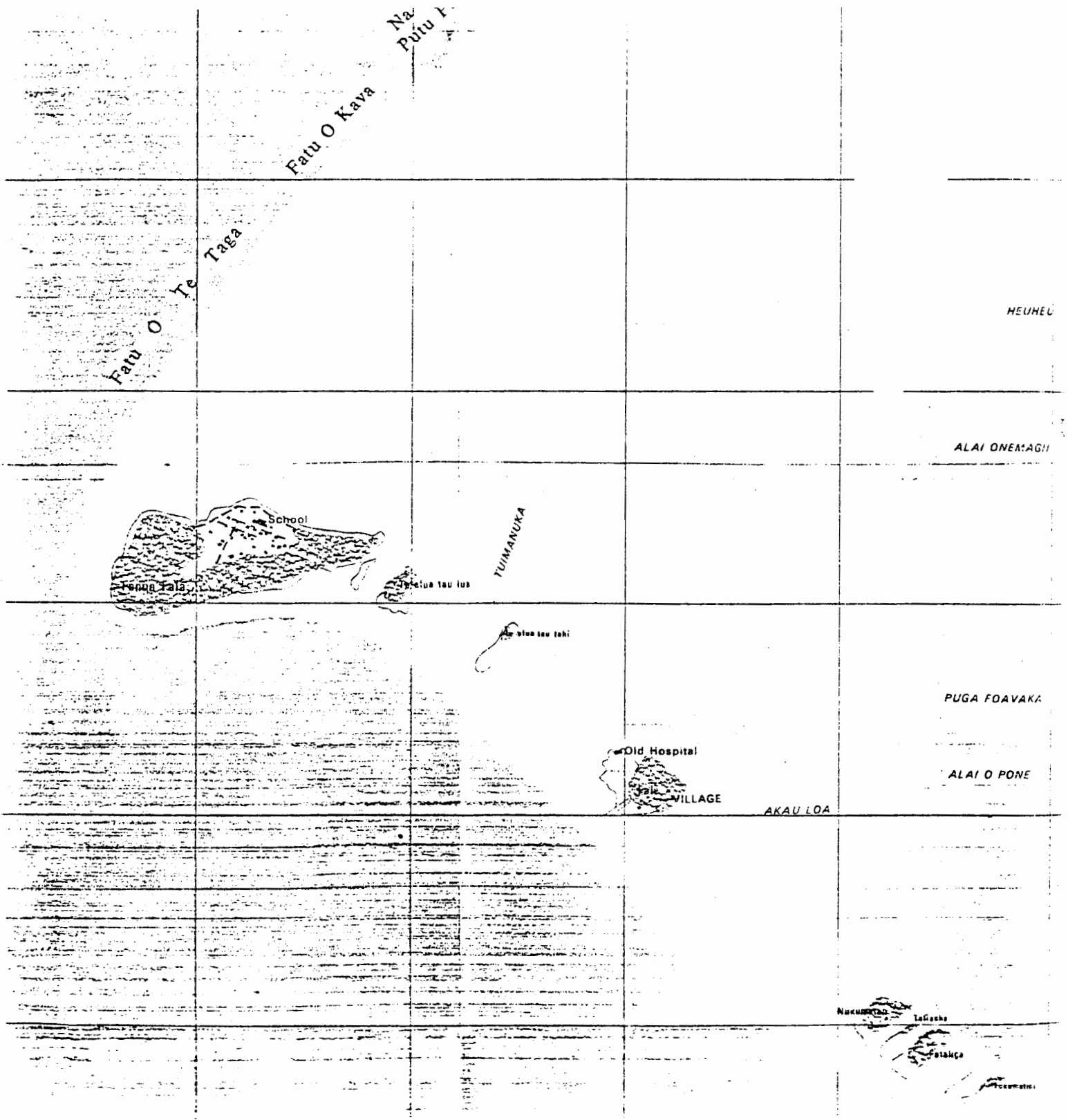
Map 2. Fakaofo Atoll

Source: New Zealand Department of Lands and Survey (1974)



MAP 3. The Islets of Fale and Fenuafala

Source: New Zealand Department of Lands and Survey (1983)



available. Other sources of food are breadfruit and (in Fakaofo and Atafu), pulaka (Cyrtosperma chamissonis). Table 3 shows the nutritive values of some of the foods. Because pulaka and breadfruit are only available seasonally (and not available at all for some islands) and are easily destroyed by tidal waves and hurricanes, the marine resources provide the (arguably) staple food for the majority of the population. Fish is abundant in the unpolluted lagoon, the reef, and the sea, and is the major source of protein (figure 3). Next to the fish, the coconut is the single most important food and is used by virtually everybody for utu (kernel), hūa (drinking coconuts), and katiga (meat). Both fishing and agriculture are highly dependant on the weather and the season. During the laki (hurricane season), fishing is usually restricted and there is a greater reliance on birds, crabs, and other food sources. Pigs and chickens are eaten on special occasions.

Daily temperature is fairly constant in the 80s. Rainfall averages over 100 inches per year with less from April-October (droughts occur periodically). During the other half of the year (the laki) storms, hurricanes, and tidal waves can occur. These rarely cause illness or death but can seriously deplete food supplies for a long time afterwards as mentioned earlier (8).

The subject of kinship and land tenure in the Pacific Islands is extremely complex and has been extensively studied by numerous anthropologists including Malinowski (1921), Firth (1957), Macgregor (1937), Sahlins (1971), and Huntsman (1967). The Tokelauan kaiga (kinship unit) is perhaps best described in relation to other Polynesian systems.

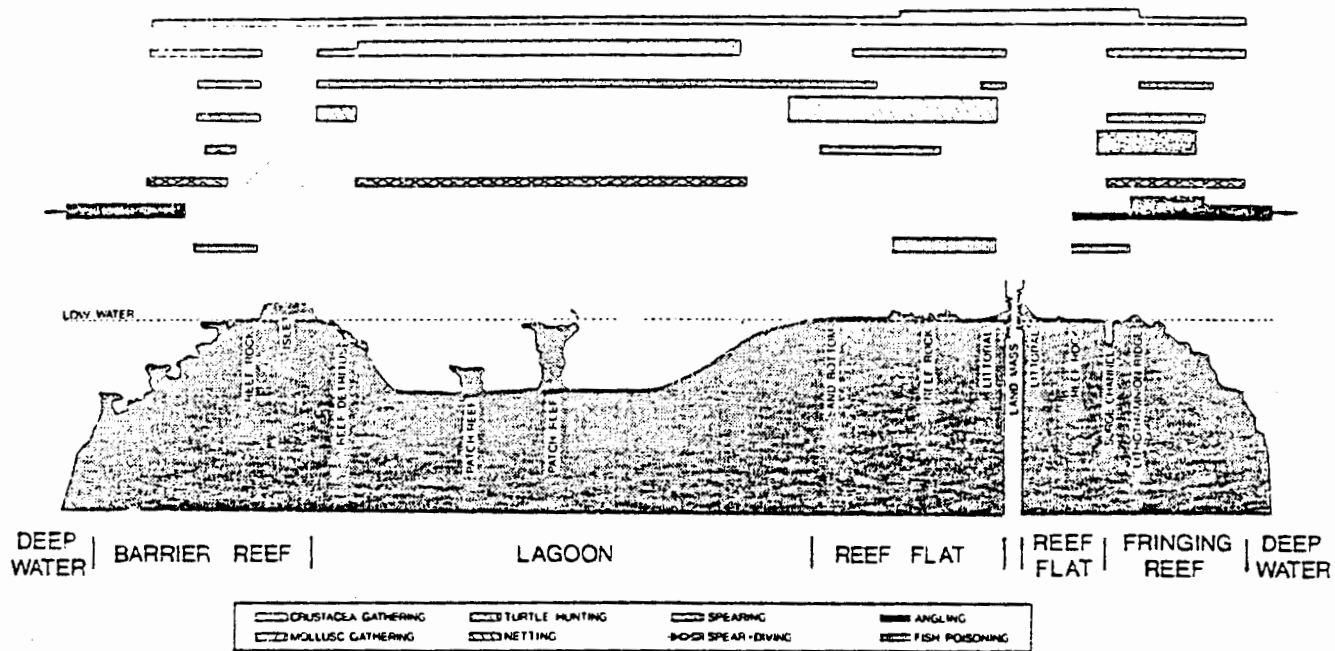
Table 3. Important Staple Food Crops of the South Pacific Islands

Source: Searle (1984)

Common Name	Scientific Name	Origin ^a	Plant Structure ^b	Distribution ^c	Composition per 100 g edible portion ^{d,†}
Coconut	<i>Cocos nucifera</i>	Pacific islands	Palm	All islands	Mature kernel M 3-50 g E 351-500 cal P 4.0-4.7 g C 5-15 g
Sago	<i>Metroxylon sagu</i>	S.W. Pacific islands	Palm	Papua New Guinea	M 17-40 g E 285-362 cal P 0.1-0.5 g C 71-87 g
Breadfruit	<i>Artocarpus altilis</i>	S.W. Pacific islands	Tree	All, but dominant in E. Solomon Islands, Tonga, Western Samoa, Cook Islands, Kiribati	Fruit flesh M 69-80 g E 55-110 cal P 0.8-4.3 g C 12-26 g
Banana	<i>Musa spp.</i>	S.E. Asia	Single stemmed herb	All	Fruit flesh M 62-76 g E 85-142 cal P 1.0-1.3 g C 20-35 g
Yams					
Greater Yam	<i>Dioscorea alata</i>	S.E. Asia	Climbing vines	{ Papua New Guinea, Solomon Is., Fiji, Tonga, Western Samoa, Micronesia	<i>Dioscorea spp.</i> M 55-75 g E 95-161 cal P 1.0-2.5 g C 15-39 g
Lesser Yam	<i>Dioscorea esculenta</i>				
Taro (Aroid)	<i>Colocasia esculenta</i>	Assam-Upper Burma	Herb	All (rare in Kiribati)	M 54-73 g E 100-165 cal P 1.4-2.0 g C 24-39 g
Giant Taro (Aroid)	<i>Alocasia macrorrhiza</i>	Indonesia-Melanesia	Herb	All, but prominent in Western Samoa, Cook Islands, Tonga	
Swamp Taro (Aroid)	<i>Cyrtosperma chamissonis</i>	Melanesia-Polynesia	Herb	Micronesia, Polynesia	
Chinese Taro (Aroid)	<i>Xanthosoma sagittifolium</i>	America	Herb	All but Kiribati, important in Tonga and Western Samoa	
Cassava	<i>Manihot esculenta</i>	America	Shrub	All except Kiribati	M 60-67 g E 130-150 cal P 0.5-1.2 g C 30-35 g
Sweet Potato	<i>Ipomoea batatas</i>	America	Herbaceous vine	Papua New Guinea, Fiji, Solomon Is., Cook Islands, Kiribati	M 59-76 g E 90-150 cal P 0.5-3.4 g C 22-34 g

Figure 3. Major Fishings Techniques in South Pacific Islands

Source: Kirch (1986)



Sahlins (1971) describes a ramage system of Hawaii, Tonga, and the Marquesas characterized by a common descent group ranked by genealogical seniority with succession to political positions by rule of primogeniture and a truncated descent group (Samoa, Uvea, and Futuna) which are not internally ranked according to genealogical primacy but by leadership qualification. Atolls diverge from both of these models and have been adapted to limitations of arable land, sporadic surplus production, scarcity periods, and peculiarities of resource distribution. A premium is thus placed on a personnel organization which exploits each resource to the full and facilitates rapid and equitable goods distribution. Natural disasters which devastate food supplies have been shown to leave major social changes in their wake (Daniellson, 1955). The process may be said to resemble the small population effect in producing rapid shifts in gene frequencies in organic populations.

Pukapuka is an atoll in the northern Cook Islands which has been extensively studied by anthropologists (Beaglehole and Beaglehole, 1938; Beaglehole, 1957; and others) and is a classic example of these adaptations. Besides patrilineal lineages, there are matrilineal lineages, age grades, district, village, and island groupings. Every individual belongs to each type of group. Each type of group acts as a unit in population control, production, and distribution. Patrilineal lineages work land strips devoted to coconut plantation, matrilineal lineages excavate taro pits, villages administer reserve lands of taro, coconut, and wild food. Old and young men's age classes organize deep sea fishing and island wide distribution of fish taken. Elements of this complex system may be traced to a major tidal

wave which occurred 350 years ago, leaving 15 men, 2 women and their children on the island (Sahlins, 1971).

In Tokelau, small truncated descent groups are characterized by matrilineal residence and defined by a group composed of all those using a particular land tract by right of descent from the original holder (Goodenough, 1955). The senior segment of this group resides patrilocally, resulting in a "stem lineage". The entire lineage holds the land but the administration is vested in and monopolized by the core line. The term kaiga varies in use according to context. It may refer back to all descendants of a common ancestor, but more often it is used in the sense described by Huntsman (1971): a corporate group identified by the name of the elder who represented them in the village council, having common rights to property (coconut plantations), and rarely persisting more than two or three generations. At this point, the land is usually divided into subunits which form new kaigas. As in Pukapuka, there are reserve lands administered by the village, differentiation of work and responsibility by age grade, aumaga (working men's groups), fafine (women's groups), and toeaina (old men).

On Nukunonu, fishermen exploit the reef and lagoon using diving and netting techniques, usually involving at least four people; often twenty or more. Open sea fishing takes place only once or twice a week. Coconuts are transported from outer islets in boats with a deep draft on a large scale, cooperative basis (Huntsman and Hooper, 1975). In Fakaofo, fishermen regularly exploit the open sea using

outrigger canoes (today in aluminum boats with outboard engines) in parties of two to four congenial men. A man who goes fishing is required to deliver the fish not to his wife but to his oldest sister or his mother (if alive and well). She then distributes the fish to all the brothers, sisters, and the fisherman himself so that every family receives an appropriate share, depending on need and reciprocity. On almost every weekend, a trip is made to uta (the outer motus) to collect coconuts for the following week. This too is distributed by the mother or the sister to all members of the extended family. On a special occasions such as an interisland fong (council), weddings, and funerals, a village wide expedition may be organized and the catch distributed to the whole community. With the new institution of public service jobs, a new good has been introduced (money) which is no longer distributed in the old way. It is usually the wage earner who holds on to the money and distributes it according to family needs and his own generosity. This creates a dysjunction between the traditional political power and economic work-power and is gradually causing a shift to a nuclear family pattern.

The villages still demonstrate an exceptional solidarity and cooperation for village projects. Gossip is endemic (and indeed remains a major force in social control), but face-to-face arguments are rare even after heavy drinking. Arguments will at most lead to a fistfight, but knives or weapons are never used. There has been no report of murder on the islands in recent times. Even adultery is most often settled peacefully. This pattern differs significantly from other parts of the Pacific (e.g., Samoa) where even in rural areas violence is more prevalent.

Men usually walk bare chested and wear lavalavas. Women wear dresses, skirts or lavalavas. They are not permitted to wear pants or go sleeveless. Almost all go barefoot. Children of 1-3 years frequently go bottomless. The toeaina (the village elders), one per extended family, make up the taupulega, or ruling council in Fale. The aumaga, traditionally the warriors, are the men between 18 and 60, who now form the main work force of the village. They meet several times a week for unpaid community service such as house construction, fishing activities, and special projects. Some women are employed as teachers and nurses but the majority are engaged with taking care of the children, housework, and handicraft making. Men fish, gather coconuts, work the pulaka pits, and (those not employed by the public service) work with the aumaga for at least 2 days a week. Public servants pay a percentage of their salary to make up for not doing the volunteer work.

The remainder of this description will focus on Fakaofo, and particularly, on the village of Tai on Fenuafala. The total land in all the motus of Fakaofo is 612 acres. 11 are on Fale, and about 60 on Fenuafala. The village of Tai occupies about 5 acres while the rest is mainly dominated by plantations of coconut and pandanus which are jointly owned by the entire community of Fakaofo. There is adequate room for more expansion, but there are plans to build an airstrip on Fenuafala which would take away most of the available land. There are several pulaka pits on Fenuafala and most houses have begun experimenting this year with vegetable gardens (9). Outside the village, the department of agriculture is experimenting with hybrid

goats, pigs, and new vegetables. There are no shops on Fenuafala; all shopping is done at the cooperative store in Fale. By decision of the elders, all private enterprise is illegal. The only exceptions are handicraft making and kaleve (coconut sap syrup) production, which are closely regulated and marketed by the Office for Tokelau Affairs in Apia. Fermented kaleve is sold illegally on the island.

Financed by a New Zealand sponsored housing scheme, virtually all houses have iron roofs, and all have concrete tanks for water catchment and water seal toilets outside each house. Most houses are open-walled with collapsible coconut-plait "blinds". Very few have mosquito screening but infants ~~were~~ are usually provided with nets. The flooring is composed of raised coral gravel, stones, and/or coconut midribs, and covered by mats of plaited coconut and pandanus (these exclusively for sleeping). There are numerous unoccupied houses. There are 32 occupied houses and a total of 36 couples (10). There is also a school (to form 4), a hospital, a church, a radio transmitter station, and 2 government guest houses. Few of the houses contain tables, chairs, or beds. Electric lines were set up in Tai but due to generator failure, the people have been using kerosene lamps for over a year. The hospital and the school have their own small generators which run for several hours every evening. Most families have radios but these are infrequently used because of the expense of batteries. A few families have videos and these are used to show films to the community several nights per week (by hookup to the school generator).

Few people remember in any detail the old religious system. Historical accounts disclose that Tui Tokelau at the Fale Atua (god house) in Fakaofu was the chief god of Tokelau to whom all the atolls sent tribute. A number of other gods, including nature gods and ancestral gods were worshipped (Macgregor, 1937). There are a number of similarities between these, Pukapukan traditions (Beaglehole and Beaglehole, 1938), and the accounts of Tikopian rites (Firth, 1967). Differences in the names of the gods may be related to deification of individual ancestral figures. Firth's account of Tikopian ritual is probably the closest account of traditional Polynesian religion in the small islands of the southwest Pacific. According to his description, the aliki (chiefs) were the direct descendants of the gods and presided over lengthy seasonal rites called the "Work of the Gods".

Today, virtually everybody on the islands is Christian. The influence of the Church is not as strong today as its once was in the early "theocratic period" but it still remains a major aspect of Tokelauan culture. On Sunday, fishing is prohibited along with any kind of work, travel, or even making an umu (traditional oven). Although no objection is made to premarital sex, a single pregnancy results in both fines by the elders and temporary excommunication by the church elders (often the same individuals). Dress codes are strictly regulated (women must not uncover their shoulders or thighs) and people never completely undress even when bathing. During the weekdays, choir practice, hymn reading, and evening worship obtains wide participation especially by the women. Nukunonu is Catholic, Atafu is Congregational, and Fakaofu has Catholics, Congregationalists, and Jehovah's Witnesses (11).

Health services on the atoll are directed by a medical officer trained at the Fiji School of Medicine. Dr. Elekana has done appendectomies and has operated on the acute abdomen using peripheral block. He has also done Caesarian section, although this is rare. His major responsibilities lie in administration of the hospital, clinic, and vector control team; and treatment and referral for chronic disease. There are fully trained staff nurses (who do deliveries and treat uncomplicated problems independantly), nurse-aides (who dress wounds), and medical assistants (who perform a variety of duties, including survey work, vector control and sanitation). The staff are full time employees of the public service. Referrals for further diagnostic and operative treatment are sent to Apia, and if necessary, to New Zealand. Because of the expense, this is usually limited to acute or infectious cases. Problems of the older age group such as suspected cancer of the colon or reproductive tract are less often sent overseas. There are frequent workshops on nutrition, family planning, and vector control sponsored by WHO and the local health department. Women's groups play a major role in coordinating public education and community hygiene.

Tokelauans equate good health with robustness, vitality, and body strength. This is very similar to the account of Chambers and Chambers (1985) for Tuvalu: The common answer to "Ea_mai_koe?" (How are you?) is "Malohi" (strong). Being a "man" is incongruous with being a sick person. Men take conspicuous pride in the ability to perform strenuous male activities like climbing coconut trees, carrying heavy loads and spending all night fishing trips in rainy and stormy weather well into middle and even old age.

Major limitations on health promotion and disease control are the financial constraints, problems related to transport and communications, and not least, the problem of training medical officers and keeping them in Tokelau. M.O.s (medical officers) who have spent several years training outside the islands are reluctant to readjust to life on Tokelau. There is no way to stop them from leaving but there may be a "black mark" put on them so that they are embarrassed to return at a later date. There is also a special problem dealing with family planning and reproductive problems since many of the women are related and traditional "respect" makes it difficult for male M.O.s to relate to female relatives on these issues. There is also a lack of all but the most elementary lab facilities and even an x-ray means a trip to Samoa.

There are many similarities between Tokelau, Tuvalu, Pukapuka, and Tikopia. All of these are largely self-administrating, semi-traditional, tiny islands (or island groups) in the Polynesian cultural realm. Although there are significant differences in environmental (Tikopia is not an atoll), social (Tikopia was the last to be missionized), and political (Tuvalu is truly independent, Tikopia and Pukapuka are part of other countries, Tokelau is a territory) parameters between all of these areas, they have all been extensively studied by anthropologists and there are similarities which are relevant to an understanding of the culture on any one of them. For this reason, in the discussion, comparisons will be drawn from all of these.

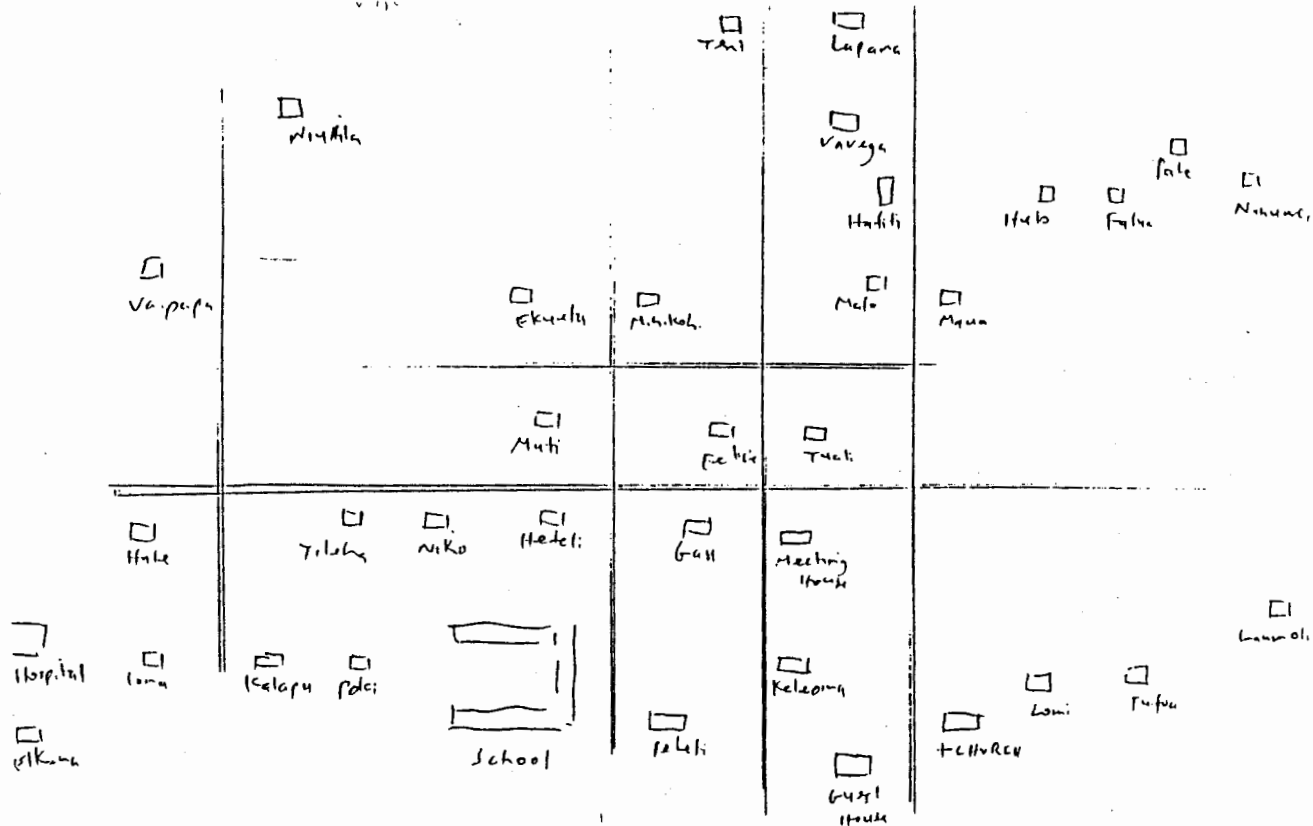
Materials and Methods

An arrangement was made through the director of health of Tokelau to conduct a limited survey in collaboration with the local medical officer. As mentioned, only the village of Tai was studied.

The months of June through August, 1987, were spent in Fenuafala. A considerable amount of time was devoted to language study and informal discussions with a variety of informants including educators, administrators, health workers, traditional medical practitioners, and a crosssection of the different age groups in the population. My most important informants were Dr. Elekana (the M.D.), Dr. Iona (the retired M.D.), and Pio Tuia (the administrative officer). I spent as much time as possible with the elders on the island (because of their knowledge and experience) and the young people frequently came to see me on their own accord. Through conversations at leisure, fishing expeditions, and community events, I came to know the community on a household to household basis. My acquaintance with the social dynamics of Fenuafala was further enhanced by the remarkable rapidity by which gossip spread through the village.

The formal study consisted of one or two visits to each of the 32 houses on Fenuafala (map 4). In most cases, a detailed interview was conducted with the housewife of each family, taking about an hour or two in the morning, using an interpreter for questions and answers. Where there was a person who was fluent in English (like the local school teachers), that person was interviewed directly, without an

MAP 4. Village of Tai, Fenuafala



interpreter. The interview consisted of a detailed social and medical history. Census data were not available locally because all the records and the administration building were washed away during the recent hurricane. A careful count of all family members was made by age and sex. Where there was any doubt about the accuracy of responses, a repeat visit was made to the family. The medical history, conducted in standard fashion as an unstructured interview, attempted to identify any operations, injuries, major illnesses or medical problems, or any hospital stays of family members.

Data on morbidity was obtained strictly on a historical basis, supplemented by checks with family members and neighbors. Two categories were studied: "Minor" causes of morbidity included episodic skin infections, gastroenteritis, and upper respiratory infections. Because of the high prevalence of these problems, an exact measurement of prevalence was not attempted, and the figures presented are only a rough approximation based on discussions with informants. "Major" causes of morbidity included any case of serious illness (chronic, except for injuries and problems remedied by surgical procedures) during the lifetime of the person. This was done to obtain the relative prevalence of causes of morbidity in a situation where the population was too small to yield meaningful results within a single year.

Arbitrary (and subjective) indices were used for rates of smoking, drinking, obesity, and single pregnancy, as follows: Anybody who would purchase tobacco on a regular basis was considered a smoker.

Anybody who would participate in drinking parties (usually consuming a liter or more of beer or kaleve per session) would be considered a drinker. Any person responsible for a pregnancy out of marriage (including an adulterous relationship with a married woman; excluding the situation where the two married) was considered in the list of extramarital pregnancies, whether the person was male or female. In none of these cases were both parents currently residing in Fenuafala. Obviously, the number of males in this category was underestimated in relation to females. Obesity was judged in relation to persons of comparable age in "good fitness".

The following sources of bias were present:

1. Many of the environmental and social parameters on Fenuafala were different than on Fale (water-seal toilets, no electricity, presence of school and hospital on Fenuafala; the opposite on Fale).
2. Barriers related to language and culture were problematic and rendered some of the data less than perfect. Although my research assistant was a native Tokelauan, she had been away in New Zealand for over a decade. Her family ties, feelings, and personal belief were a further source of bias.
3. I was personally (as well as the M.O. and the A.O.) a participant-observer during my three months in Fenuafala, and was subjected to a variety of biases as a result of the daily gossip, informal interviews, and community events.

4. The study is mainly based on personal histories and was not backed up by any lab studies. The data related to drinking, smoking, extramarital pregnancies, and obesity was mainly obtained from community informants using standards that were not rigidly defined.

5. Similarly, the data on morbidity and mortality was obtained from discussions with the M.O., patient histories, and community informants.

Limitations of time, personnel, equipment, and resources prevented a more thorough treatment of the problem. Nevertheless, in the absence of any comparable studies in the area, it was felt that a study of this kind was worthwhile as an intersectoral analysis of the present situation of public health in Fenuafala. Its relevance and comparability to other atolls in Polynesia remain to be determined. The entire findings were reviewed by Dr. Elekana, Dr. Iona, and Pio. Their comments and suggestions were extremely useful in compiling this report. Fina Kirifi was my volunteer research assistant. Her assistance in both the formal and informal study was invaluable.

Results

Social survey

The population consisted of two-hundred and fourteen persons.

Significant findings were a steep decline in population over the age 19 and a much higher than expected male:female ratio in the age group 10-19 (figure 4). A disproportionate amount of single males was found in the age group 16-21: There were seventeen single males but only five single females. Above 50, there were eight single females but no single males (figure 5).

The mean household consisted of 3.4 adults, 3.3 children living at home, and 2.6 children overseas. Only one couple had no children.

X Three had only adopted children. Of the thirty-six couples on Fenuafala, in eleven, the wife was older than the husband. In four couples the wife was at least seven years older than the husband. There were fifteen couples with one spouse over 50. Twelve of these contained at least one family member who was either a cousin, nephew or niece. Ten had married children and grandchildren in the house. In all but one of these households, the married couple stayed at the wife's home. In these situations the older couple usually slept in the umu (the traditional cook-house). The percentage of all households including married children, grandchildren, grandparents (the mother of the primary couple), and "adopted" persons (almost always, relatives) is shown in figure 6. The total number of these "non-nuclear" family members is shown in figure 7.

Figure 4. Sex Distribution in Fenuafala (1987):

Number of Persons (Total:214)

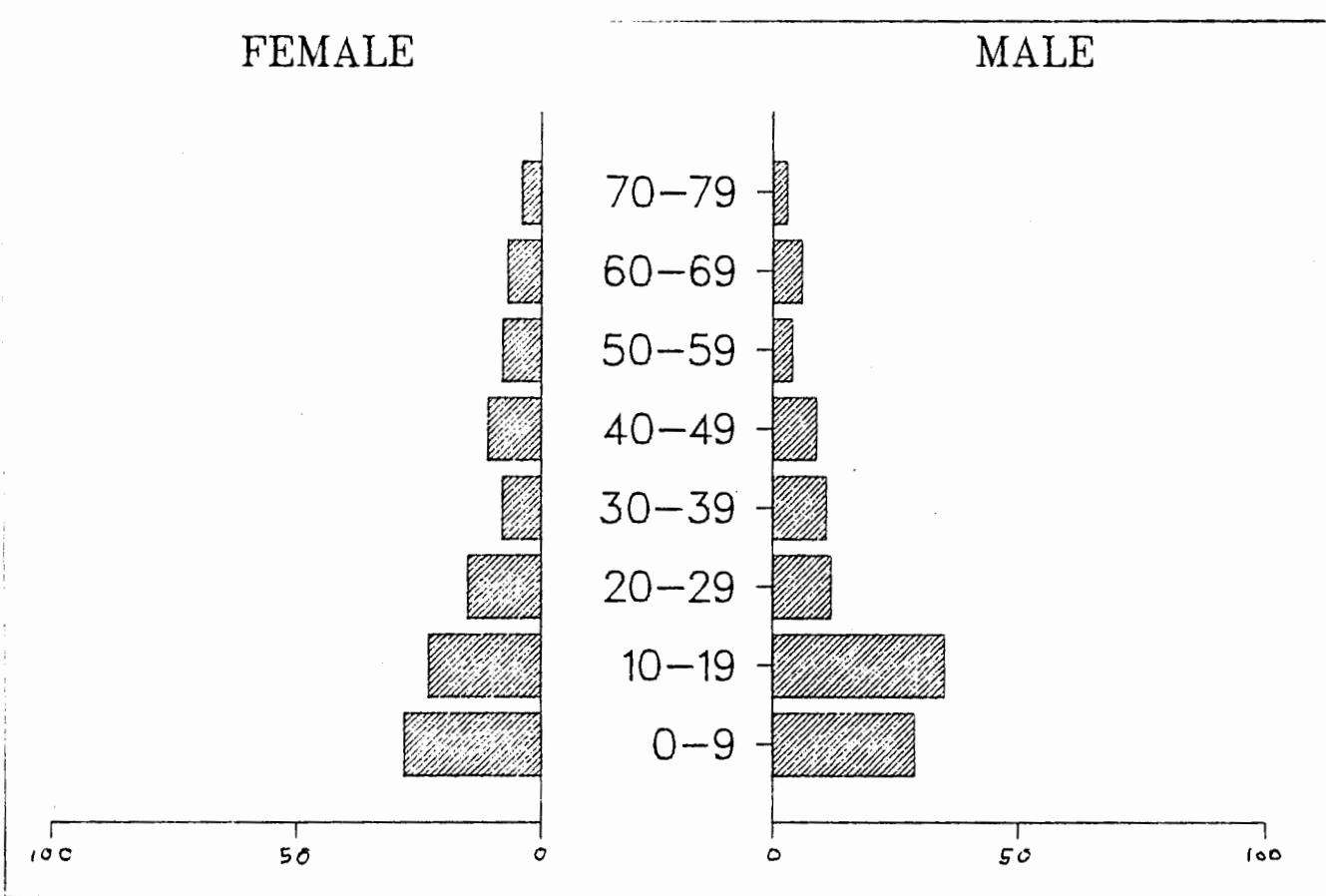


Figure 5. Single Adults in Fenuafala
(1987): Number of Persons

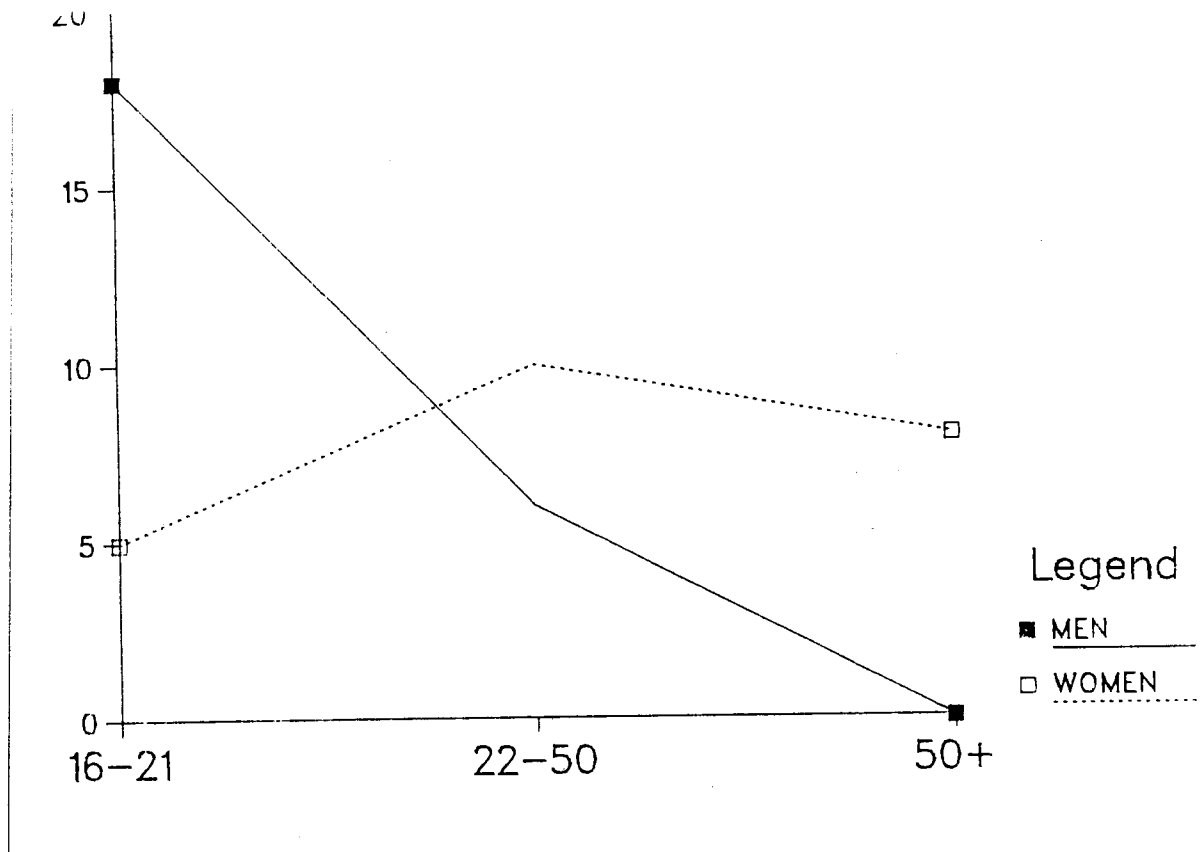


Figure 6. Extended Family Households in Fenuafala (1987):
Percent of all Households

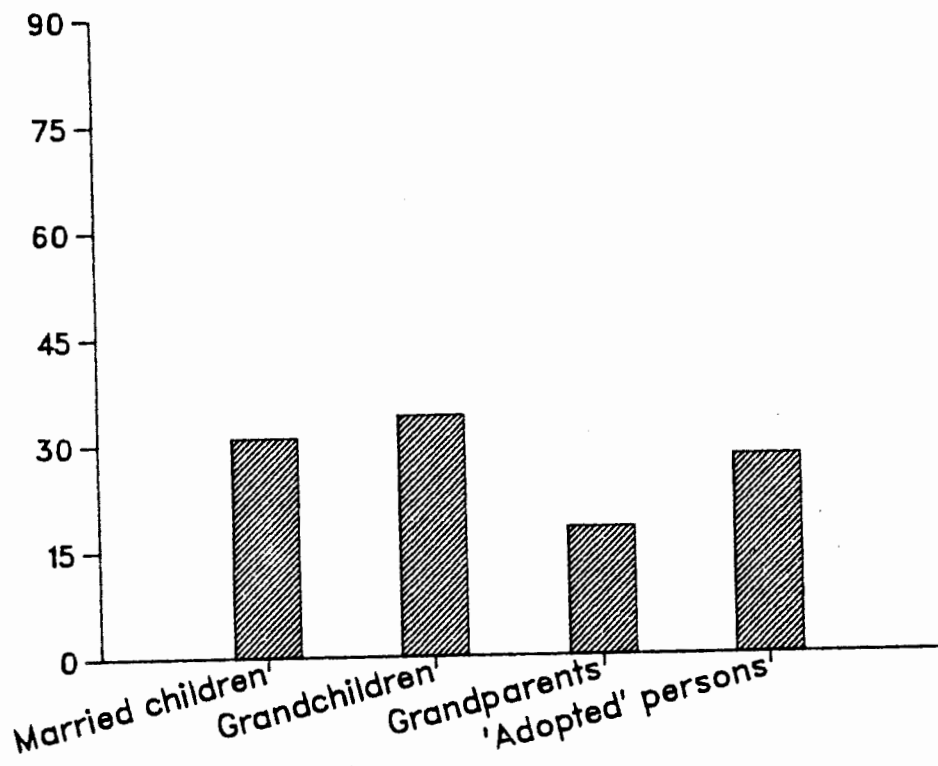
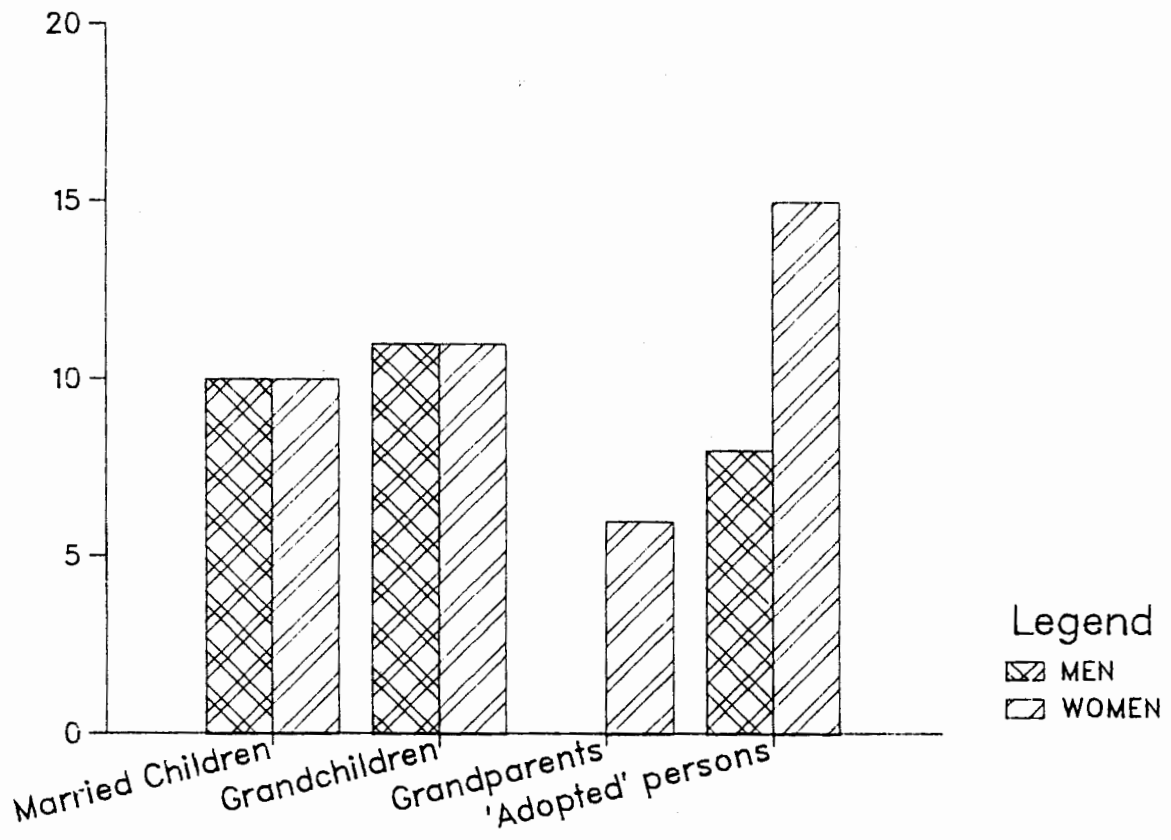


Figure 7. 'Non-Nuclear' Family Members in Fenuafala (1987):
Number of Persons



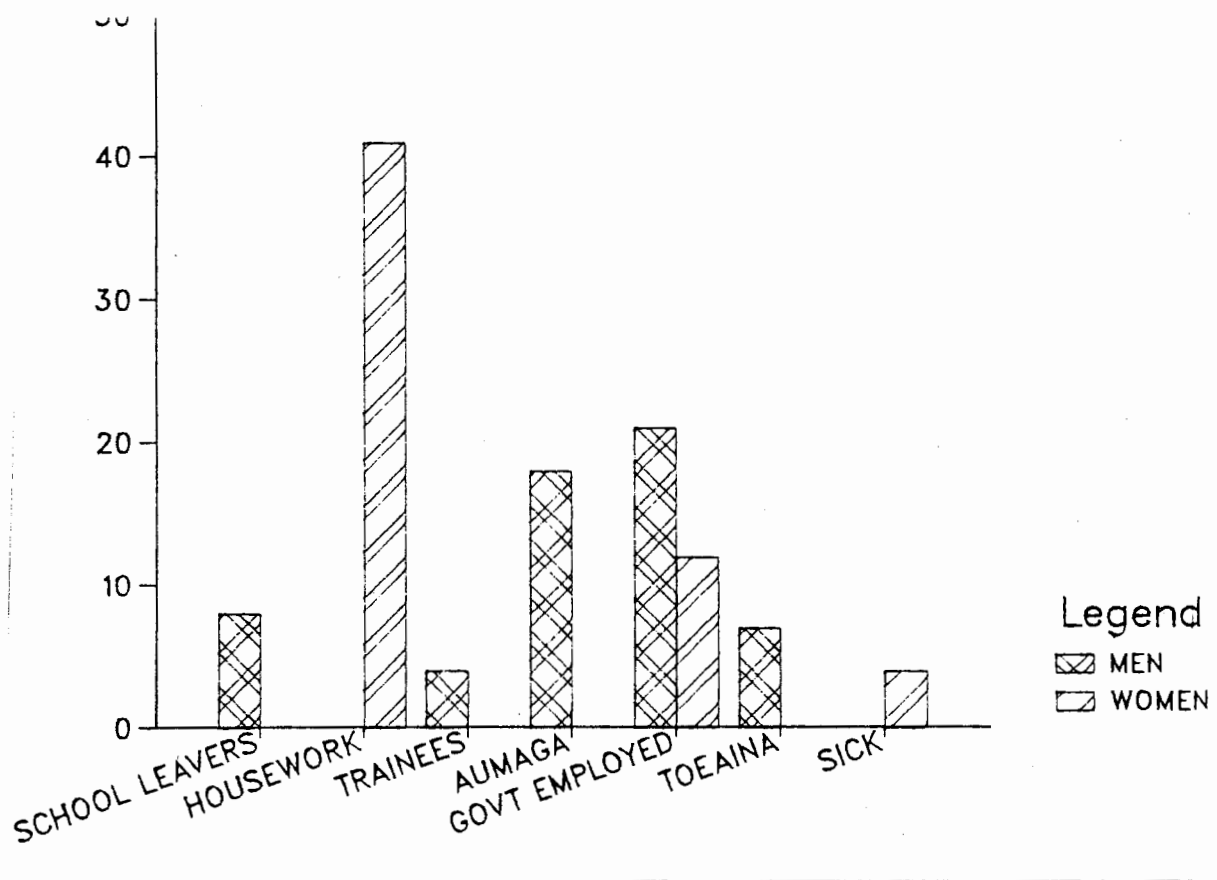
Aggregated figures on live births in Fenuafala from the five year interval 1982-1987 yielded an average of 6.2 per year. Aggregated figures for all deaths during the same period yielded an average of one death per year. This would obviously lead to an increasingly dense population, but the many empty houses suggest a population decline. This, again, is probably explained by emigration to New Zealand. I was unable to get aggregated figures for migration. During 1986, four families moved to Fenuafala from Fale. Among these were two teachers who moved to be closer to school. Two families moved because their houses on Fale were damaged by the hurricane. A single teacher came after completing her scholarship in Samoa. An old woman from Fale was taken in by her relatives in Fenuafala. As far as outward migration is concerned, three families moved to Fale (to take care of houses when relatives went to New Zealand), one family moved to New Zealand, and one family moved to Samoa.

Employment in Fenuafala is skewed along sex lines (figure 8). Women traditionally cannot participate in most fishing activities, agriculture, and construction. Outside of housework and raising children, they are engaged in mat weaving, but some are employed with the public service as teachers, nurses, shopkeepers, radiooperators, and clerical workers.

Data concerning social problems can at best represent an approximation. Wife-beating was frequent, condoned, and usually occurred after heavy drinking. Some women insisted they "did not mind it" and seemed to accept it as part of the culture. However, the men

Figure 8. Employment by Sex in Fenuafala (1987):

Number of Adults



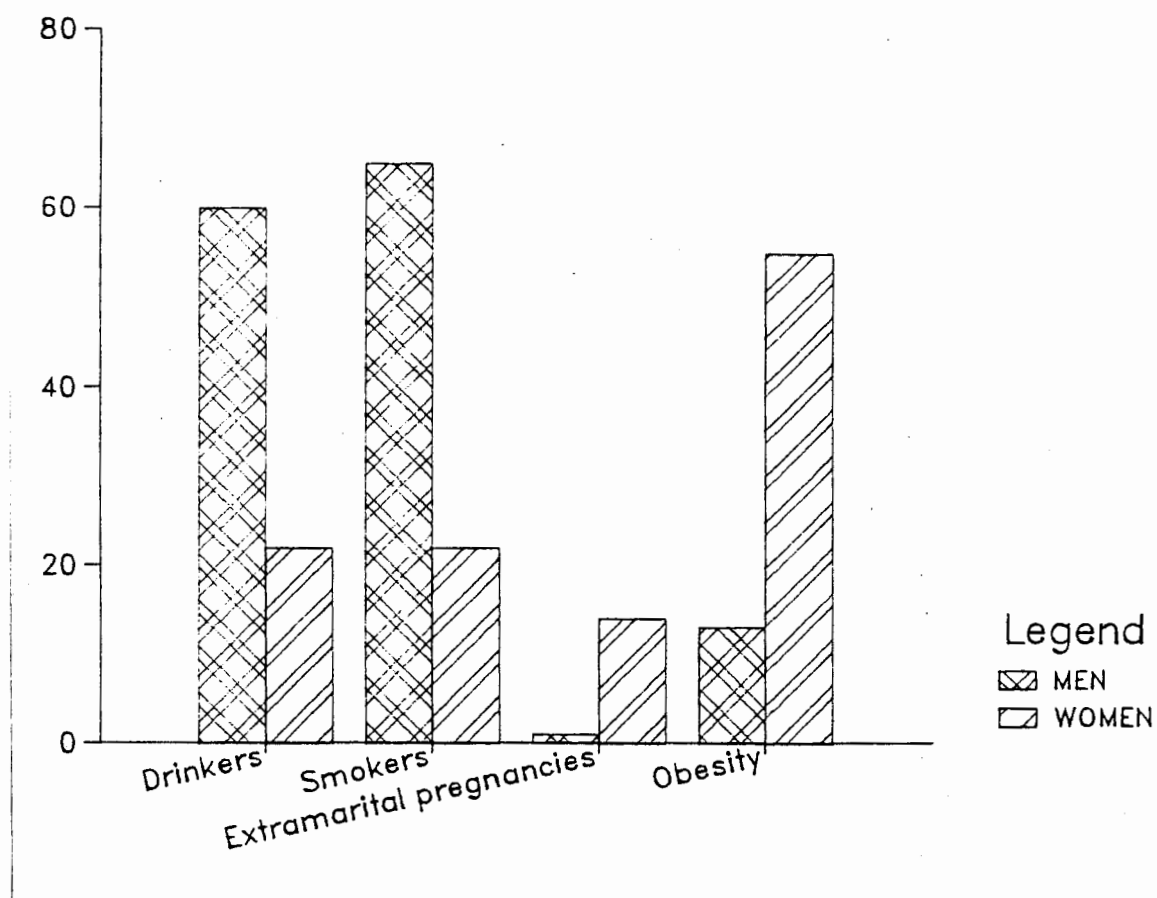
were expected to keep within certain limitations: the beating was described as "a hiding" and they were expected to use their open palms rather than the back of the hand and certainly not the fist. Drinking and smoking were prohibited until age 21 although young people frequently began to "practice" before this. In the age group of 21+, there were forty-three males and fifty-three females. A majority of the men (but less than a quarter of the women) drank and smoked. A majority of the females were obese (figure 9). Most of the men were in excellent physical condition. There were two single mothers. X
Divorce was infrequent. In many marriages, the bride was either pregnant, or had a previous child before marriage. Homosexuality was present but not frequent.

The children frequently complained of not being free to express their feelings to their parents. Many women also complained of not being able to be open with their husbands.

Medical survey

Regional studies of medical problems in the Pacific Islands have, to a large extent focussed on mortality (e.g., Taylor, Lewis, and Levy, 1986). Data on morbidity is less readily available on a regional basis, but a number of studies have been conducted for the Pacific Islands (among the most important overviews are Coyne, 1984; Iyengar, 1968; Miles, 1984; Taylor, Henderson, Kolonel, Levy, and Lewis, 1985; and UNICEF, 1986) and for Tokelau (Elliott, 1963; Prior, Stanhope, Evans, and Salmond, 1974; and Prior and Stanhope, 1980). Pacific

Figure 9. Social Problems and Public Health Risk Factors in Fenuafala (1987): Percent of Adult Population



Island countries have been categorized (Taylor et al, 1986) in terms of their position along a spectrum of epidemiologic transition from a prominence of infectious disease in the least developed countries to a prominence of chronic disease in more developed countries. Although power supply is sporadic, sanitary facilities are marginal, and there are no overseas telephone links; in terms of education, standards of living, and mortality, Tokelau could (arguably) fit the description of a more developed country (at least compared to some of the Melanesian regions).

Hooper and Huntsman (1980) report on life-expectancy figures derived by Stanhope from baptismal records in Fakaofu. These show a life expectancy of 62.2 years for males and 62.9 years for females. I could not find disease specific mortality rates, but the deaths recorded in recent years in Fenuafala were due to cancer (including cancer of the colon, lung cancer, and gynecological cancer), heart disease (including stroke and congestive heart failure), and "old age" rather than to infectious disease (except for complications of chronic disease). The serious causes of morbidity are also characterized by chronic disease but in terms of prevalence, minor infectious problems are more prominent. Hence, two categories are described: Day-to-day infectious problems are compared according to the relative prevalence in the total population; chronic diseases are presented in terms of the total number of persons with a lifetime history of a specific problem (figures 10 and 11).

The most common medical problem was staphylococcal skin infection (usually occurring after reef bruises and lacerations). Prior and

Figure 10. "Minor" Causes of Morbidity in Fenuafala (1987):
Relative Prevalence

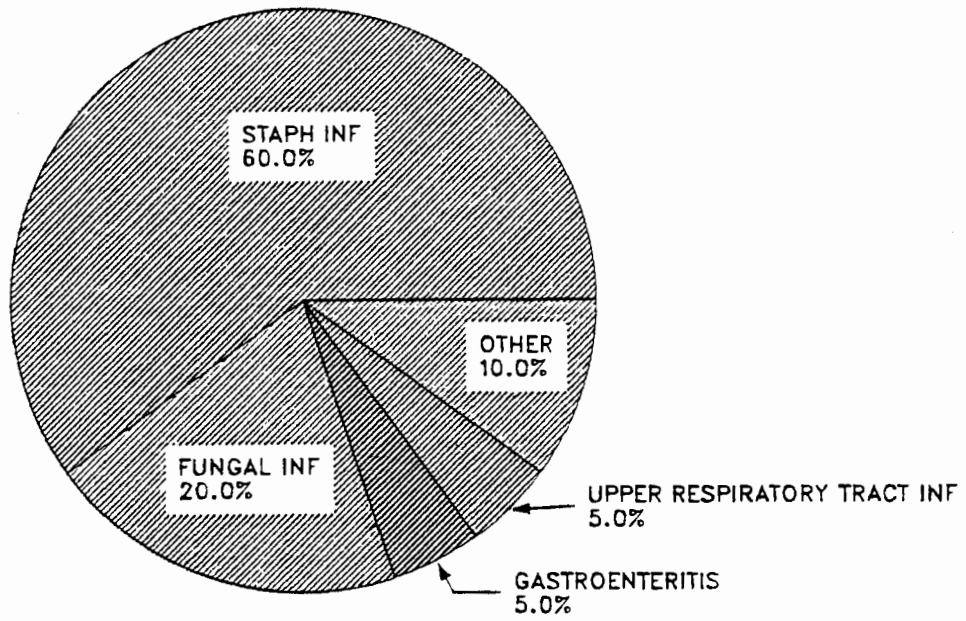
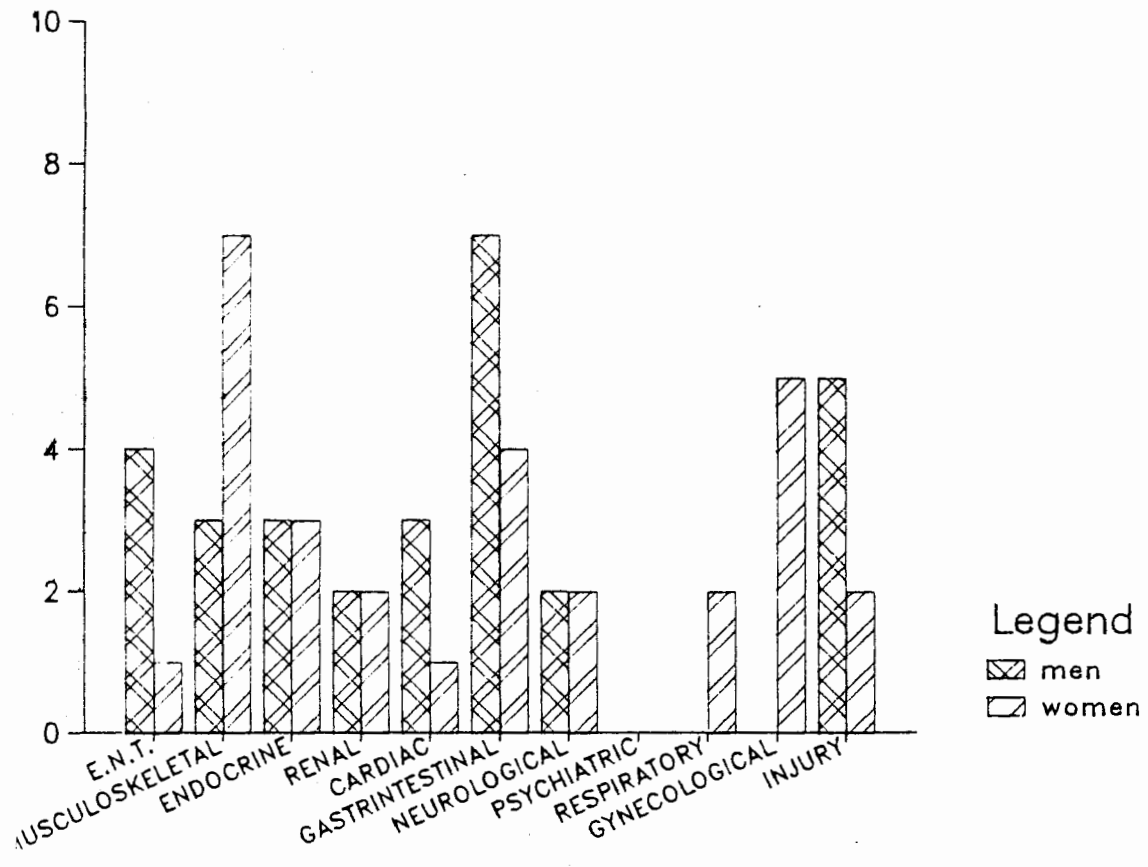


Figure 11. 'Major' Causes of Morbidity in Fenuafala (1987):
Total Number of Cases (Population: 214)



Starhope (1980) report a rate of 17% of children and 3% of adults in 1976, but this seems like an underestimation of the present prevalence. Fungal skin infections were also very common, including Trichophyton imbricatum and Pityriasis versicolor. Both types of skin infections were extremely prevalent, often required prolonged systemic treatment for cure, and reinfection was common. Lice and scabies were also common. Upper respiratory infections were reported to have declined in severity and prevalence from past decades, but they still occurred after the monthly visits by the steamer from Apia. Gastroenteritis was common in children but seldom caused serious morbidity.

I was not able to obtain laboratory data for hypertension, diabetes, and gout, but the M.D. informed me that all of these disorders were becoming a major problem. He informed me that almost all of the toeaina from Fale and Fenuafala had hypertension. Diabetes and gout were also suspected to have increased. Prior (1979) reported on the longitudinal studies of the Tokelau Island Migrant Study. Prevalence rates for Hypertension and diabetes were significantly higher for Tokelauans migrants in New Zealand compared to the community in Tokelau. The higher rates were mainly attributed to an increase in body mass although other factors were also implicated. In recent years, Tokelauans are relying more on imported foods and technology and it would be no surprise if hypertension and other chronic diseases are indeed becoming more prevalent.

There was a high rate of occupational injuries, mostly among men. This included falls from coconut and pandanus trees (especially during

rainy periods) and rooftops; and drowning while fishing or swimming. Musculoskeletal disorders were prevalent including back injuries, hip injuries, sciatica, and degenerative and rheumatoid arthritis, and (with the exception of the latter) are most common among women who spend long periods weaving and handicraft making. Asthma, dysfunctional uterine bleeding, and urinary tract infections (mainly among women) are present but less common. There was only one case of elephantiasis on all Fakaofu. Figures on microfilaremia were unavailable but related morbidity appeared to be on the decline (probably related to previous mass treatment of the population with heterazan and also to improved mosquito control). I was unable to obtain any data on hepatitis A, but the prevalence has already been reported to be on the decline (Prior et al, 1974) due to improved water supplies and sanitary facilities. No data at all on hepatitis B were available. There was no reported leprosy. Other diseases that were not reported include tuberculosis (present on Fale, probably underdiagnosed in Tai), polio, yaws, typhoid, and dengue. There was no known case of sexually transmitted disease of any kind on Fenuafala, but on Fale there was a minor epidemic of gonorrhoea several years ago introduced by a Samoan. There were no psychotic disorders reported. However, there was a young boy whose behavior was different than others his age, and Dr. Iona suspected that he might be borderline schizophrenic.

There was a surprisingly high prevalence of epilepsy on Fenuafala. Three (possibly four) households out of thirty-two reported at least a single case. One case involved a fall from a coconut tree which

caused concussion and subsequent epilepsy (the boy drowned afterwards while spearfishing outside the reef). Another household reported epilepsy which ran in the family and effected the grandmother and two grandchildren (the two children at about age 10 also died of drowning). There may be some relation in the remaining cases with birth asphyxia since there is no way to monitor fetal distress and Caesarian section is rarely practiced on the islands.

Dental caries and peridontitis affected a major part of the population. Radiographic facilities were unavailable in Tokelau but there was a qualified dental officer and a dental nurse who (both) performed fillings, extractions, and minor surgery (the dental officer only). Flouride pills were unavailable.

Medical treatment was limited to dressings, tablets, and injections for skin infections (all of these frequently ran out of supply); medication for diabetes, hypertension, and gout; antibiotic therapy for pediatric cases (ear, respiratory, and GI infections); vaccination for polio and tetanus (MMR vaccine was frequently unavailable); treatment of emergency cases and referral to Samoa or New Zealand. In all of these situations, traditional practitioners were consulted at least as frequently as the medical staff. I discovered at least fifteen of these practitioners. Most of them were women. They practiced herbal remedies, massage, pressure application, and therapeutic rituals. Most of the practitioners were specialists in one or a few types of treatment but some of them claimed to treat practically anything. The "therapeutic rituals" frequently involved

the practitioner acting as a "spirit medium" for one of his/her deified ancestors and may represent the last remnant of the practice of Tokelauan religion.

The M.O. administered "the pill" and occasionally inserted an intra-uterine device for birth control, but diaphragms, condoms, or contraceptive sponges were unavailable. Single women were not permitted to learn about or receive birth control from the hospital. Married women cannot receive help unless their husband consented. Abortion was not offered in the hospital, but a herbal potion was (rumored to be) administered by traditional practitioners to induce abortion. I did not hear about (nor did I expect to find) any instance of infanticide.

Discussion

The discussion will be divided into 3 sections: environmental, social, and political determinants of health and disease. This division is arbitrary since many political determinants overlap with social determinants. However, in the political section I will discuss issues relating to administration and village economics and in the social section I will discuss issues more closely related to the realm of the household.

Environmental determinants

X The natural environment in the Tokelau Islands is outstanding for its abundant sunshine, adequate rainfall, ample marine resources, and the availability of coconuts, pulaka, breadfruit, and other foods. Pricer et al (1974) found that 56% of the calories in Tokelau came from fat, of which 80% were derived from coconut. Today, there is an increasing amount of dependence on calories from white flour, rice, and corned beef. However, the overwhelming source of protein is fish, and coconuts still provide a significant source of nutrition. The sunlight provides an abundant source of vitamin D. Starvation and malnutrition are unheard of except after a serious natural disaster. Most of the tropical diseases of Africa and Asia are not problematic in Tokelau. Environmental factors do contribute to skin infections, injuries, filariasis, and gastroenteritis, and may also be related to a number of other disorders.

Since the traditional diet in Tokelau includes uto, katiga (coconut "meat", also the major feed for the pigs), hua (drinking coconuts), and fish, coconut palms are climbed almost daily. Injuries occur both from falling and from coconuts dropping on the head. Breadfruit and pandanus are climbed less frequently and are less hazardous because they have branches. Fishing demands lengthy exposure to the sun, rain, wind, and sea; and problems include dehydration, hypothermia, motion sickness, bruises, bites, and stings by a variety of marine organisms. Other hazards encountered during fishing are sudden storms, lightening strikes, and engine failure. (Most fishermen used outboard engines on aluminum boats and did not carry paddles.)

Suppurative skin infections are caused by reef bruises and mosquito bites, and aggravated by inadequate hygiene and the abundant flies in the open walled fales. The flies breed in the bush and in the rubbish in the village. The mosquitos are a nuisance mostly after a few days of heavy rain. They breed in swamps (again after heavy rains), uncovered containers and coconut shells, and uncovered catchment tanks. Fungal infections are promoted by the heat, frequency of damp clothing, and poor hygiene. Low rates of mycobacterial infections may be related to the abundant ventilation provided by the trade winds in the fales.

The supply of safe water and sanitation has much improved in recent years since every house on Fenuafala has its own concrete catchment tank and water seal pit latrine. However, the supply is often limited, especially after a period of drought, and there is no indoor

tap. This leads to inadequate hygiene. Catchment of water necessarily means a water supply deficient in fluoride. This is no doubt related to the frequency of caries and periodontal disease on the island (12). Fluoride tablets are unavailable on Fakaofu in spite of previous promises by the health department. Water seal toilets are wasteful, and in view of the limited catchment available, pour flush toilets or even VIP latrines might be preferable. During dry periods, toilets frequently go unflushed, and gastroenteritis can be transmitted by flies. The situation is worse on Fale where over water latrines are used right where people are bathing and boarding boats. In spite of numerous complaints, pigs roam freely on both islands and they actively fish (for themselves) on the reef.

Perhaps the major environmental problem Tokelauans face is the frequency of natural disasters including hurricanes and tidal waves. The major part of the settlement is right on the beach and all but the strongest houses can be simply washed away. In Nukunonu, a large supply of agricultural insecticide was swept into the lagoon this January (following a tidal wave), and all the adjacent coral is now dead (the long term effects have yet to be seen). Certainly, all the unus, copra sheds and canoe sheds suffer major damage and may take a long time to replace. In Fakaofu, the entire administration site and the clinic were destroyed. This was because they were built on an exposed peninsula. Because of issues related to land tenure, the toeaina are reluctant to permit these buildings to be rebuilt elsewhere, but these considerations are an important factor in any development project on the islands.

Social determinants

Tokelauan society is cohesive and characterized by extensive community cooperation, as manifest by kinship affinities, women's groups, the auuaga, and the taupulega. Any demonstration of potential deviousness is looked upon with suspicion (13).

Family and neighborly support is an important factor in any consideration of health and disease on the islands. Chambers and Chambers (1985) list 3 forms of support in Tuvalu. The description is equally applicable to Tokelau: Sick persons are believed to benefit from the presence of kin around them and the "alofa" (love, concern, affection) people have for each other and express in caring for the sick. People visit those who are ill, and if needed, move into the household to help care for them. It is considered inappropriate and unkind to leave an ill person unattended. Another form of support is bodily contact. The limbs of a sick person, especially the hands, arms, and thighs are lightly rubbed, stroked and presses, often for long periods. Severely ill infants and young children are held. The physical contact not only relaxes and comforts the patient but also allows those taking care of him a tangible way of expressing concern. A third form of support is to indulge and encourage the patient's expression of food whims and cravings. Sympathy is shown by sending over a delicacy that will tempt the sick person to eat. This might be bread or a kind of fish the person is known to like, a cooked chicken; or for children, a papaya or biscuits.

In the traditional Tokelauan lifestyle, family support, as well as a number of sociocultural factors prevented and mitigated against a number of problems which are emerging nowadays.

The young people were traditionally left to their own devices as far as friendship and sex were concerned. Under the influence of the missionaries, premarital sex was officially discouraged, but there was (and still is) no interference with nightly activities at the "love beaches" as long as no pregnancy resulted. Avoidance of pregnancy was accomplished mainly by coitus interruptus (withdrawal), although the rhythm method was also (imperfectly) utilized. An extramarital pregnancy was cared for under the extended family system. Even today, most households had a number of residents who were "adopted" into the family. According to Firth (1957), population control in Tikopia was regulated by a variety of methods including post-partum sex abstinence (still practiced in Tokelau) and infanticide, accomplished by turning the new born infant (more often females) on their stomach. There is no evidence that this was practiced in Tokelau although there definitely were periods of hunger (Hooper and Huntsman, 1980) when strict population control would likely have been attempted.

Missionary influence discouraged any kind of birth control, abortion, or infanticide. This tended to increase fertility. Modern antibiotics and hygienic improvements reduced the mortality rates. This is presenting a major population increase which is presently being contained only by migration to New Zealand. As long as New Zealand continues to accept Tokelauans freely, the population will not

be a problem. However, the extensive migration causes a "brain drain" of the most capable and promising young people, and represents a "waste" of scholarship funds (which make up 25% of the budget). There is also no guarantee that New Zealand will continue to accept Tokelauan migration indefinitely. There is also a problem for those who want to return to Tokelau. Once adjusted to the freedom of life in New Zealand, they find it very difficult to readjust to the social constraints of life on the islands. They are used to having privacy and the right to lead their own lifestyle, but in Tokelau, a high degree of conformity is expected from all residents.

The disproportionate demographic structure is a further undesirable consequence of this dysequilibrium. The findings are similar to those reported by Pirie in rural Western Samoa (Pirie, 1976), and may be explained in the same way: A surplus of children may be due to a high fertility rate exaggerated by a tendency for mobile parents to leave children with more stable relationships in rural areas. The decline of population in the adolescent age group may be due to movement of the young people seeking education and employment outside the village. The imbalance in sexes may reveal a willingness to send some of the girls to the towns and a reluctance to send the boys away.

Under the influence of western culture, the nuclear family is gradually beginning to replace the extended family system. On the atoll of Nukunonu (which is Catholic and has had more exposure to western culture), the nuclear family has largely replaced the extended

family. People do not look after their brothers and sisters except on special occasions. On Fakaofu, the extended family still is present but it is on the decline. Fish is still shared and never sold. A wage earner is expected to contribute to paying bills at the shop and to pay for fishing expenses (although there are variations between families). Change to a nuclear family system can be expected to cause a decline in the support systems which were so important for caring for the ill. It may also mean a greater reluctance to care for unwanted children.

Before western contact, tobacco was unavailable and alcohol was limited to kaleve (which had to be specially prepared). Today, virtually all of the adult males smoke and drink (beer and kaleve - no other form of alcohol is readily available) except for those who don't for religious reasons (14). There have been several deaths from lung cancer reported in Tokelau and they are expected to increase with the prevalence of smoking. There have also been a number of cases of cirrhosis of the liver suspected to be linked to alcohol consumption (more on Nukunonu). Aside from the medical problems, alcohol is a significant factor in social discord. Most of the intrafamilial and interfamilial arguments are said to originate in a drinking bout. Even today, violence is limited to spouse abuse and the occasional fistfight (both mainly after heavy drinking), murder is unheard of, and the only known cases of (possible) suicide occurred when a couple eloped by canoe to escape antagonistic parents. However, this may all change along with the growing popularity of western films (often violent) shown on video.

In some instances, the introduction of western influence may prove helpful to the health of the population. Certainly, family planning may be an easier load on the women (and the men) than abortion, infanticide, and war. The contribution of improved hygiene has already been mentioned, but ideas relating to higher status for women and children may have a major impact on these two important segments of the population. Many of the women find the island men to be dominating and insensitive. They also complain of recurrent infidelity of the men. They are frustrated because of what they perceive as lack of opportunities on the island and frequently migrate to New Zealand to find a job and a husband more to their liking. Changing perceptions of the roles of husband and wife may eventually alleviate this problem. There may eventually be greater room for expression of feelings between family members. There is also a tendency towards an internal code of ethics as compared to the "social code" present in traditional Polynesian societies (described in Firth, 1957, Howard, 1971). It is hard to know what the long term effects of this kind of change will be.

Political_determinants

The influence of the missionaries on traditional Polynesian lifestyles can hardly be overestimated. Their influence on the social sector has already been mentioned. Their influence in the political sector was just as substantial. Beckett (1957) describes the impact on Pukapuka in the northern Cook Islands, and historical evidence shows the same occurrence in Tokelau: Missionaries arriving in the latter part of the nineteenth century managed to completely displace the old religion in a few years. By the end of the century, a "theocracy" was established. The missionaries extended recognition to cooperating chiefs who, in return, became their secular arm "trying thieves, fornicators, adulterers, and Sabbath breakers brought to them by constables and imposed fines and other more humiliating punishments such as head shavings and stocks" (Beaglehole, 1957). Followed by colonial administration in the 1920s, during which a foreign resident agent ruled the island, the chiefs "lost their mana", overshadowed by the councils in the villages.

However, in contrast to some other parts of Polynesia, the traditional system of leadership (with the exception of the aliki and the gods) in Tokelau is largely intact (15). There is no foreign administrator living in Tokelau (or any New Zealand representatives). Each island is governed by a taupulega (council of elders). They are led by a faipule (chief of the elders) and a pulenuku (director of village affairs). About twenty toeainas (elders) make up the council in Fakaofu. They meet in the falefono (meeting house) in Fale every week. A coral slab which was worshipped as Tui Tokelau has been

excavated and replaced in its original place at the head of the falefong (although it is no longer worshipped). The toeaina are the highest decision making body on the islands. They are the living repositories of Tokelauan traditions and are regarded as the "heads" of the community. They are divided into a number of committees which are responsible for political, legal, administrative, economic, and social decision making. They also direct the work of the aumaga. In this and their other responsibilities, they represent the wishes of their extended families rather than acting autocratically. This is, in fact, in accordance with tradition. According to Firth (1957), the Tikopian aliki did their best to satisfy the wishes of their people, whom they regarded as their children.

The traditional system was, and still is, extremely egalitarian. Through ties of kinship and community cooperation no single person was "left out" without food, shelter, or other basic needs. There was also no division of classes based on income. The aliki were, indeed, an upper class, considered almost like gods, but (as a rule) they took no undue economic advantage of the people, whose welfare they were charged with. Until the last decade and a half, the Tokelauan economy could be described as Firth did in Tikopia: "First. . .the personalization of its economic relations. . .Secondly, the operation of the profit motive is conditioned by other psychological factors concerning the social role of accumulation and use of wealth. Thirdly, there is a code of reciprocity in economic transactions, but this is but part of a wider code which obtains for all types of social relationship. . . and receive much more overt and institutionalized expression than in our own type of society" (Firth, 1975).

The aumaga system in Tokelau represents a formalized, traditional institution of community cooperation and participation. While individual households are generally free to plant their own pulaka and manage their own coconuts and fishing expeditions, there are at least a few days per week that all men are required to volunteer their labor for village work. Formerly, this took the form of copra gathering and preparation, community building projects, and large scale fish drives and turtle drives. Today, the copra work has declined partly as a result of falling world prices, and partly as a result of hurricane damage to the plantations, and the major work of the aumaga is with an extensive and ambitious housing scheme which is attempting (and is well on the way to completing over the last years) to supply every household on Fakaofu with a "European-style house", a water tank, and (in Fenuafala) a private latrine.

Over the last decade and a half, New Zealand has introduced a salaried system of public service which threatened to become autonomous from the toeaina. The public service comprises the entire salaried body of administration, education, health, transport and communication, and agriculture and fisheries. It is headed by the Office of Tokelau Affairs in Apia which also coordinates all relations with the outside world. Many of the public servants with new ideas felt that the taupulega was old-fashioned and a western style of government was needed. In addition, they felt that Tokelau should introduce tourism, promote industry and development, and abolish the aumaga in favor of salaried workers for any village project. There was an attempted rebellion but the mass of the people backed the toeaina who remained in control. A delegation of the toeaina, including the faipules of

the three islands, travelled to Wellington to meet with the New Zealand government. They conveyed their dissatisfaction with the public service system which had been introduced. The Prime Minister acquiesced to their complaints, and reaffirmed the commitment of New Zealand to administration by the traditional Tokelauan system. A status quo was reached whereby the Office of Tokelau Affairs in Apia is ultimately responsible to the toeaina. During the general inter-atoll fongos (several times per year), the elders meet with a delegation from the Office and political and budgetary issues are decided. The toeaina also regulate the week-to-week functioning of the public service during their weekly fongos. This places the administrative officers on the atolls in a difficult position because they are responsible nominally to both the Office and the toeaina, often an impossible job because of conflicting agendas. However, they do their best to satisfy both, using the traditional Tokelauan system of avoiding controversy if at all possible.

The introduction of wages and aid into the communal, subsistence economy has had the effect of destabilizing community cohesion and the authority of the elders and is promoting individualism and selfishness. It also results in dependence on aid money and a decline in traditional fishing activities. Families rely increasingly on corned beef, sugar, white flour and rice instead of coconut, pulaka, and wild greens. There is a corresponding decline in the traditional, strenuous physical activities such as paddling canoes, copra collection and preparation, and work in the pulaka pits. Obesity is,

fact, most common among women, elders, and public servants. This is the group that has the least physical exercise. This group is also predisposed to a variety of other health problems, including backache, diabetes, gout, and stroke.

Conclusions

The parameters of health and disease in Tokelau relate to the limited natural resources of the coral atoll environment, the expanding population, and the introduction of a western style wage economy and administration. Each of these are complex issues which were discussed extensively with the A.O., the M.O., and the young adults. They are all problems which cannot be dealt with by the administration or health department alone, but necessarily involve interdisciplinary planning.

Natural disasters remain a major problem and can (to a degree) be dealt with by appropriate selection of sites and buildings for records, equipment, and potential pollutants. Skin problems could be contained by ensuring an adequate supply of dressings and antibiotics. The control of flies and mosquitos involves questions of polluting the environment as long as people continue to live in open walled fales. Because of the climate, these are the most comfortable type of dwellings, are still preferred by many residents. Under the recent building scheme, "European-style" houses are tending to replace the fales. They are being built to provide water catchment and to provide better security against hurricanes. People feel that thatched roofs would provide poor quality of drinking water and be difficult to maintain. The wells provide a limited and sometimes brackish source of water.

In spite of numerous community workshops on family planning held in recent years, the fertility rate shows no sign of slowing. One of

the problems relates to the limited methods of birth control available. People are hesitant to use them because of side effects. Prophylactic methods are cheap and could easily be made available. Sex education is even a more pressing issue especially in light of the concern about AIDS which has already spread to New Zealand. There are substantial problems related to migration, including a disproportionate age and sex structure and difficulty for returning emigrants readjusting to Tokelauan society. The impending breakup of the traditional extended family system threatens to take away the valuable family support presently still available and is related partly to the influence of Tokelauans returning from New Zealand, and partly to the political economic changes in Tokelau.

Perhaps the most significant problem facing Tokelau is the headlong rush towards modernization. To some extent this is being controlled: tourism is discouraged and private enterprise is "illegal." Handicraft making is the major local enterprise. However, an ever larger section of the population is being incorporated into a money economy through public service jobs. Traditional fales and dances, which were the most impressive aspect of traditional Tokelauan technology and an important part of their culture, seem on their way to extinction (just during the past ten years). Formerly, fateles (traditional dances) were performed almost on any night the men did not go fishing. These dances (which I was fortunate enough to participate in) were a major element of Tokelauan culture. Both these and the communal fishing expeditions served as a galvanizing force to unify the community even after the demise of the aliki. It seems likely that both of these are

headed for extinction as time "becomes money" and the fateles are seen as old-fashioned. It is also easier to open a tin of corned beef than to spend all night fishing. Airports and roads are being contemplated and many feel that tourism will soon follow.

Very little attention is paid to the long run implications of development. Materialism is very quietly replacing the subsistence lifestyle and ideology. The development of production and acquisition of wealth are gradually becoming the highest goals in relation to which all other goals are second place. Tokelau is becoming dependant on outside aid where it could formerly be described as a system of subsistence/affluence. In a society unique for its egalitarian nature a division into rich and poor classes has begun.

Pio, the administrative officer in Fakaofu, agreed that there is not enough attention being given to the social and cultural impact of development. He suggested that a committee be set up by the toeaina to monitor potential problems caused by development projects. My discussions with Pio may have been my most significant contribution to Tokelau. A coral atoll with unspoiled and unpolluted land and marine resources would be a perfect place to apply the economic system proposed by Schumacher (Schumacher, 1973), where small is "free, effective, creative, enjoyable, and enduring".

Recommendations

I approach this section with no small amount of hesitation because of the limited amount of time I have spent in Tokelau; unfamiliarity with some issues concerning culture, tradition, and technological constraints; limitations related to the quality, quantity, and scope of the data available; and problems related to my present distance from Tokelau, Apia, and Wellington. Nevertheless, the M.O., the A.O., the Office, and many of the togaia and the other Tokelauans have specifically requested that a report of the study, including a list of suggestions, be made available to them. This, then, is a list of some suggestions from an outsider which may be of interest to the Tokelauans.

1. A special committee of Tokelauans should be established in order to monitor the potentially deleterious aspects of modernization and development. This should include members of the togaia, the auaga, the women's groups, and the public service. As far as possible, it should attempt to incorporate persons with the diverse points of view characteristic of the community so that no one faction is excluded from the decision making process. It should also encourage the help and cooperation of the women who would not normally participate in this type of forum, but whose advice would be extremely useful. A gradual weaning from a present reliance on aid to a self-sufficient economy might be possible by a revival of traditional technology, nutritive sources, and lifestyle (See suggestion 2).

2. At the same time the committee debates the pros and cons of European houses, motorboats, and freedoms, they should explore and reestablish forgotten or endangered elements of Tokelauan culture, including the traditional technology of the fale (house) and the vaka (canoe); natural foods gathering, preservation, and preparation; and community cooperation. The interest of the young people should be elicited by recruiting them as apprentices in the above technologies, restoration of "entitlement" rites for tautais (master fishermen), recognition and public appreciation of knowledge and skill pertaining to the old traditions, and the reinstatement of sea voyaging double canoes. Competitive events such as canoe racing (in the lagoon or the sea) can be a good way of eliciting a response.

3. It would be desirable if a third village can be established in which volunteer couples would be allowed to build Tokelauan homes and live "on the land", possibly on the island of Fenualoa which is village property. If, as emerged from my discussions with Pio, Tokelau is only "experimenting" with development, there is a need for a control, without which the experiment is likely to be a permanent fixture, regardless of whether it is truly beneficial on a long-term basis. The toeaina should be encouraged to view this as a confirmation of the values and traditions of their ancestors rather than as a "new experiment".

4. Condoms, diaphragms, and contraceptive sponges are essential in prevention of AIDS and population control. Literature on these and other contraceptives should be distributed including an adequate and

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intelligible explanation of the reasons and objectives of family planning (including child spacing). A dynamic, ongoing program should be instituted which will work with the community until an active momentum is established. The young couples should be especially targeted. Distribution of "barrier" contraceptives should be made via these couples on a voluntary, cooperative basis to avoid the unpleasant experience of going to the hospital.

5. Anticipating the return migration of the first generation of migrants to New Zealand, a special committee on migration should be established. This committee should examine and propose ways to incorporate children born in New Zealand into the local school system, and ways to incorporate the adults into a village lifestyle from which they may have become alienated and ignorant of. It should also attempt to introduce local Tokelauans to some of the values of the returnees, such as those concerning personal freedom and privacy. Both of these groups have much to benefit from each other, but there can be considerable obstacles in implementing this kind of respect and consideration, including jealousy towards the new returnees, and a patronizing attitude by the returnees toward the local Tokelauans.

6. Health risks and social problems should be dealt with head on as these are preventive measures which can forestall serious and expensive medical investigations, procedures, and other unnecessary suffering. Smoking should be seriously discouraged. The community leaders, including the faipule, the A.D., and the M.D. should set an example for the others by quitting. "Import substitution" of kaleve

(which appears to be less socially disruptive) for beer should be encouraged. Offenses committed after alcohol consumption should require community service to specifically benefit those persons that were victimized. Programs of weight reduction, including physical work and aerobic exercise, should be explored.

7. The department of education should send a Tokelauan for advanced training in psychology and social work. This person, on returning, would be able to advise students concerning career guidance and foreign travel. He would be able to counsel and mediate in family disputes, help to solve problems related to the large numbers of older, single women, and encourage the development of open, healthy relations between parents and their children. He would also be useful in serving as a link between the administration and the community.

8. A committee on injuries should be established with the inclusion of appropriate members of the aumaga and public service. This committee should investigate and document all physical injuries and morbidity related to falls, drownings, etc. Legislation on occupational hazards has been effective in saving lives in developed countries and should produce similar benefits when introduced to developing countries. Possible additional interventions include the introduction of dwarf coconut trees (although their relative productivity needs to be investigated), vigorous replanting schemes, and improved maintenance of outboard engines.

9. An adult education program should be instituted that especially targets persons at risk for chronic disease such as diabetes, hypertension, stroke, and musculoskeletal problems. Most of the people in Fakaofu were very much unaware of the etiological relationships between obesity, diet patterns, physical activity, and stress and the above disorders. Audiovisual multimedia programs would greatly enhance the effectiveness of this type of campaign. Active surveillance of risk groups is necessary for both detection and ongoing control of internal diseases that are not easily perceived until they are too advanced.

10. Ongoing infectious disease screening programs should be established to include monitoring microfilaremia rates on a temporal, social, and geographic basis; regular administration of PPD tests; and possibly mass-vaccination of the population with BCG. A Tokelauan should be trained in medical technology who would be qualified to perform analysis of blood, urine, sputum, spinal fluid, and stool samples; and be specially trained in the diagnosis of mycobacterial infections (since x-rays are not available, partly because of the inadequate infrastructure), microfilaremia, and helminths. He could also be trained in entomology, at least as far as concerns mosquitoes and flies.

11. In view of the small population in charge of the medical staff, there is adequate free time to better inform the patients concerning their respective problems. In particular, the etiology, pathophysiology, and prognosis of their own disease conditions should

be intelligibly explained to each patient making liberal use of visual and demonstrative aids such as drawings, pamphlets, etc. This could be a responsibility delegated to the medical aides under the supervision of the M.O. A substantial amount of patient education is necessary in the ongoing treatment and follow-up of patients with disease conditions such as thyroid disturbances, renal and bladder infections, as well as reproductive disorders. Flouride pills should be available for children and toothbrushing should be promoted.

12. A consultant on hydrology should be sent to Fale to explore the effects of pit latrines on the ground water since the wells are still occasionally utilized. If the ground strata are suitable, VIP latrines would eliminate fecal pollution of the lagoon and the possibility of a cholera epidemic as happened in Truk. Pour-flush toilets can also be considered, providing there is enough catchment available so that household water supplies are not depleted too rapidly during the dry season. A demonstration utilization of thatch for collection of rainwater would be useful. The iron roofs erode at a rapid rate and are quite expensive (replacement about once every ten years).

13. A workshop can be organized to train persons with administrative responsibilities on the principal components of organization, management, and basic administration. This should result in improved efficiency of most community services. Numerous persons in the village complained to me in private that they see the inefficiencies in organization and planning as the major cause of inertia in village projects.

14. Settlement on uta (outer islets) should be encouraged to spread the exploitation of the land and reef resources over a larger area. Although the replacement of copra by handicraft production and other sources of income has relieved the pressure on the coconut plantations, and although there is still apparently a tremendous reserve of untapped marine resources in both the lagoon and the sea, the biomass of large reef fish that are easily accessible is limited, and certainly the breadfruit and pulaka are limited. This should not be seen as a move to divide and scatter the community but rather as a way to cope with an expected continuing population growth.

15. The laws of Tokelau should contain a provision explicitly allowing freedom of religion for all Tokelauans. Many Tokelauans claimed that in a small island like Tokelau, the possibility of religious freedom would allow too much community divisiveness. However, today, those groups who disbelieve in the recognized churches are very much in fear for their rights and are subjected to difficulties that could easily be forestalled. In particular, the toeaina should once and for all decide that no execution, exile, or other punishment will ever be imposed on a person for religious beliefs as long as the person is a useful and cooperative community member. Deacons and church elders should receive training on the meaning of the messages in the bible. Themes such as love and service should be emphasized rather than moral and theological dogma. Periodic workshops on ecumenical and humanistic aspects of religion could help to make religion an important contributor to a healthy society.

16. There is a possibility that the public service can be restructured to include interdigitation of responsibilities and benefits with the aumaga. Members of the aumaga can be trained to replace workers from the departments of public works, agriculture and fisheries; but the teachers, administrators, shopkeepers, and medical staff are less easily replaced. However, it is conceivable that the aumaga, as well as the women, can be included in these fields as well by careful consideration and good organization. This would free public servants to participate in community work although it would require the salaries to be spread to a wider body of recipients.

17. The school library should be equipped with books relevant to atoll ecology and culture. For example, books by Alkire, Buck, and Firth should be available for study. This will be useful in exploration of many important issues at the student level. Similarly, books on atoll botany, reef fisheries, and oceanography would motivate many a bypassed Tokelauan researcher.

18. The following concerning agriculture: a) Get rid of the goats. They are extremely destructive to coconut shoots, vegetable crops and wild species. Whole islands have been denuded of trees by these animals. Because of their climbing capabilities, they are much more dangerous than pigs. Their contribution to island nutrition is minor compared to their damage, particularly when considering the adequate and varied protein resources in the ocean, the reef, and the lagoon. b) Vegetable crops endemic to the Pacific Island region should be encouraged to a greater extent than "European" vegetables such as

tomatoes, cucumbers, etc., which demand heavy nurture with added minerals including iron and phosphates. Taro, tamu (Alloccasia macrorrhiza), yam, sweet potato, and lu (an edible fern variety) are species more easily adapted to the poor soils of the atoll.

19. Aid is sometimes more productive if the community also makes a contribution. Volunteers and researchers working at the request of the community should be provided, insofar as possible, with traditional Tokelauan hospitality. There are plenty of unoccupied semi-traditional houses on Fenuafala which could be adapted for all but the most fastidious outsider (who would probably not come to the atoll in the first place). There is usually a surplus of fish in at least a few of the households every day. Some of the foreign volunteers are of substantial help to the island, and yet pay for their room and board. A display of traditional hospitality would be a tangible way of expressing their appreciation for the services of the volunteers. By assisting in this way, generation of goodwill would very likely more than offset the money charged for rent and food services.

Notes

1. For example, Lewis (1954), Adelman (1975), and Hirschman (1981).
2. The resulting fall of immature coconuts causes loss of copra production and provides breeding places for Aedes polynesiensis, the day biting mosquito which is the vector of filiriasis.
3. This story of a fish beaching on a reef and producing the first man was the only account I heard in Tokelau. The elders I spoke to denied any traditions of settlement from Samoa or any of the other islands.
4. Hooper and Huntsman (1974) also cite a tradition which refers to the settlement of Ontong Java and Sikaiana in the Solomons by refugees from Atafu.
5. Sahlins (1971) hypothesizes that natural disasters were responsible for the precolonial divergence and differentiation of cultures in Polynesia.
6. The remaining one million N.Z. is raised locally by handicraft sales, operation of the cooperative store, international sales of stamps and coins (which is a significant source of profit!), and other revenues. There are no income taxes (though Tokelau has been contemplating it). Additional funds which do not figure in the budget are received in form of grants and materials by UNDP and other aid groups. I could not receive an adequate explanation why these fundings did not figure in the budget.

7. Olosega (Swain's Island) is now claimed by the U.S. government. The few inhabitants have recently left after a tidal wave devastated the island this past January.
8. During the period of my survey, the islands were still recovering from a major hurricane and tidal wave which occurred in January. This double blow left Fakaofu with an estimated destruction of 99% of its bananas and papaya, 95% of the pulaka, 70% of the breadfruit trees (which had to be cut down to the ground), and many houses.
9. Mainly because of a successful extension program by the UNDP integrated atoll project. It is being recommended as an additional source of food and particularly, as a source of vitamins and minerals. However, there is virtually no soil on the island and there are severe problems with lack of iron, potassium and other ions for plant growth.
10. All cases of 2 couples per house occurred where a daughter-in-law or a son-in-law was incorporated into the household. I use the term "household" to refer to all people sharing a common hearth and living on commonly owned land.
11. The latter group is constantly harassed by the others because of a tradition against bringing new religions to the atoll. The elders have even threatened to send them all down the channel on rafts.
12. Toothbrushing is, unfortunately, seldom practiced.

13. This is why there is such strong opposition to new religions and even new villages outside the main island. There was a couple who lived on their own on an outer island, but the community resented their wish to be separate from the rest of the people.

14. There are a number of families that are Jehovah's Witnesses and some belong to Youth for Christ (a religious study group in the Congregationalist Church). These families are generally better educated, do not smoke or drink, are generally faithful to their spouses, and have more "open" attitudes towards family members.

15. This, and other evidence illustrates the good relationship New Zealand has had with many of its island dependencies compared to some of the other colonial powers in the Pacific. Its (apparently) inadvertant introduction of a western style of economy to the islands is perhaps the main exception to this.

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