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# Differences in physician utilization between Aboriginal and non-Aboriginal children

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**Objective.** In the present study, we examined the factors affecting Aboriginal children's visits to a medical practitioner and compared them with non-Aboriginal children.

**Methods.** We selected five Aboriginal communities and four neighbouring non-Aboriginal communities, and conducted a door-to-door survey, covering all children born after 1983. Of an initial sample of 1013 children, 896 (response rate 89.92% for non-Aboriginal children and 85.87% for Aboriginal children) completed the questionnaire for analysis.

**Results.** In all, 896 children of non-mixed lineage with an age range of 0–12 years were collected into the study, including 316 Aborigines and 580 non-Aborigines. A higher percentage of non-Aboriginal children had more national health insurance coverage than Aboriginal children. The ratio of parents using the services of an out of community medical practitioner when their children were sick was higher for Aboriginal parents than for non-Aborigines. Medical injection frequency was higher in Aboriginal children. Linear regression was used to examine the factors affecting the frequency of physician utilization in the preceding month.

**Conclusion.** A lower national health insurance coverage rate, and a higher rate of intramuscular injections for Aboriginal children plus difficulties in access to medical resources due to travel time and travel distance are still major problems for the Aborigines.

**Keywords.** Aborigine, child, physician utilization.

## Introduction

In recent years, health professionals have become concerned about Aboriginal health, which had been ignored for a long time. Health disparities are known to exist between Aborigines and non-Aborigines in the USA, Australia, Taiwan and other countries.[1–3] In Australia, the mortality of Aboriginal infants remains about three times higher than that of non-Aboriginal Australians,[1] and Aboriginal maternal mortality is still 3–5 times that of other Australians.[2] For almost all disease categories, rates for Aborigines are higher than for other Australians; death rates are up to four times higher and life expectancy is <20 years. The causes of their lower health status are complex, but the social and economic inequality of Aborigines is clearly of central importance.[4–6] The resultant overcrowding, malnutrition and inadequate housing make Australian Aborigines suffer not only a variety of infectious diseases, but also almost every kind of disease associated with diet, exercise patterns, apathy and stress. As well as the problem concerning health status, medical resource utilization is also an important issue for Aborigines. Ethnicity might have an important influence on the use of the health care systems in the USA as it might affect response to symptoms and reasons for seeking medical care.[4] It has also been found that Aborigines and members of minority groups in many countries were confronted with various barriers to medical services[5,6] due to cultural differences, ethnic background, linguistic difficulties and poverty.[5] To resolve such Aboriginal health problems, some governments have developed special policies of exceptional priority.

There are nine main Aboriginal tribes in Taiwan, consisting of ~360 000 people, most of whom live in remote mountainous regions at altitudes of 500–1500 m. In general, their health status, as evaluated by life expectancy, mortality rates and the prevalence and incidence of various diseases, is worse than that of the rest of Taiwan's population.[3]

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Current investigations indicate that life expectancy for Aborigines is on average 10 years less than that of the general population, with a standardized mortality ratio approaching 2-fold.[7] Accidental injuries, suicide, tuberculosis, liver cirrhosis, alcoholism, pneumonia, bronchitis and parasitic infections are the most important sources of disease. Hypertension, heart disease, gout, cancer of some sites and nutrition are gradually becoming important new sources of disorders. Taiwanese Aborigines have one of the highest prevalences of gout in the world.[8] A study by Chang[9] also found that a higher percentage of Aboriginal than non-Aboriginal children suffered from hyperuricaemia. National health insurance has been in use since 1994 in Taiwan. The government also wants to improve the health of women and children, in addition to upgrading basic medical care. In the present study, we examined the medical use differences between Aboriginal and non-Aboriginal children.

## Methods

*Setting*

Our study focused on the Aboriginal community in the San-Di-Men area in southern Taiwan. This area consisted of ~7000 people, 81.7% of whom belonged to the Paiwan tribe. We also investigated the non-Aboriginal community in the Kao-Shu area, located near San-Di-Men. This community had ~30 000 inhabitants belonging mostly to the Fukien Taiwanese and Hakka ethnic groups. Comparing medical service man power among the two communities, the Aboriginal area had fewer physicians per 10 000 inhabitants than the non-Aboriginal area (2.86/10 000 people versus 5.20/10 000 people).

*Design and sampling*

This study was a cross-sectional community study. We randomly selected five of the 19 San-Di-Men communities and four of the 10 Kao-Shu communities. A house-to-house study using a questionnaire was carried out by our research team in these nine communities. Children who were born after 1983 were selected from the 1994 census, and those children who had been taken to other communities by their parents, or whose parents refused to be interviewed were excluded from this study. A total of ~1300 children were expected to be included in this study.

*Data collection*

The respondents were the child's parent(s) or guardian(s). Each respondent was interviewed in their home, using a structured questionnaire developed and evaluated by the authors. The questionnaire was designed to collect information about the family's socio-demographic status, the respondents' perception of their children's health, the contact regarding their children's illness, access to medical services and their children's utilization of medical services in the preceding month. Respondents of mixed (Aborigine plus non-Aborigine) parentage were excluded from the study. Of a total sample of 1013 children, 896 were included in our final sample. As not all respondents answered every question, the number of respondents to each question varies slightly.

*Definition of variables*

The following dependent variables were considered.

(i) Frequency of medical injections: frequency with which children were given an injection while visiting a medical practitioner. We classified a frequency of $<20\%$ as rare, and $>20\%$ as frequent.
(ii) Location of physician: whether or not parents had to take their children to a medical doctor who practised outside the community.
(iii) Frequency of physician utilization: the total number of out-patient service utilizations for each sick child in the preceding month. The amount of physician utilization in in-patient departments is difficult to estimate, and is different from that in an out-patient department. Thus, encounters with physicians while the child was hospitalized were excluded.

The following independent variables were considered in this study.

(i) Predisposing factors: children's sex, age, parents' educational level and number of children in the family.
(ii) Enabling factors: family income, national health insurance coverage, travel time required to get to the health service, regular source of care (in or out of the village), the importance of travel distance (parents' perceived importance of the distance to their usual source of care) and convenience of the medical service (convenience of getting proper medical attention for their children when they were sick).
(iii) Need factors: frequency of children's illnesses and health status of children as rated by their parents.

*Statistics*

Odds ratios (ORs) with 95% confidence intervals (95% CIs) were calculated to estimate the factors affecting visits to a medical practitioner in a given location in the preceding month. Linear regression analysis was used to evaluate the factors affecting the frequency of out-patient service. Student's *t*-test and the chi-square test were also used to determine differences between Aborigines and non-Aborigines for the distribution of the risk factors.

## Results

In all, 896 children of non-mixed lineage, including 316 Aborigines and 580 non-Aborigines, with an age range of 0–12 years were included in the study. The socio-

demographic characteristics of Aboriginal and non-Aboriginal children were similar in terms of age, sex, respondents to the questionnaire and parents' income (Table 1). However, Aboriginal parents were less educated than their non-Aboriginal counterparts ($P < 0.01$, Table 1). Whereas 91.5% of non-Aboriginal children had national health insurance coverage (not dissimilar to the rate of national coverage in Taiwan in 1996), the proportion was lower for Aboriginal children (79.37%; $P < 0.01$, Table 1). Almost 95% of all parents stated that they would choose western medicine for their sick children (Table 2). Some non-Aboriginal parents might choose a mixture of western, traditional and folk medicine (2.98%, Table 2), whereas Aboriginal parents were inclined to select western medicine only. The ratio of parents using the services of a medical practitioner outside the community when their children were sick was higher for Aboriginal parents than for non-Aborigines ($P < 0.01$, Table 2). On the whole, Aboriginal parents evaluated their children's health status as worse than non-Aboriginal parents ($P < 0.05$, Table 2). Of the Aboriginal parents, 38.34% perceived that the medical service for their children was inconvenient, and this is higher than for the non-Aboriginal parents ($P < 0.05$, Table 2).

A total of 381 children were reported to have been sick during the preceding month. The prevalence rate of illnesses in the preceding month was ~42% in both groups (Aboriginal children 42%, non-Aboriginal children 42.8%). Most sick children had visited a medical doctor who practised western medicine (Aborigines 93.98%, non-Aborigines 94.35%) (Table 3). The average frequency of physician utilization in ill children in the preceding month was 1.86 in Aboriginal and 1.79 in non-Aboriginal children. The average physician visit cost in the previous month for ill Aboriginal children was significantly higher than for non-Aboriginal children (357.20 NT dollars in Aborigines and 270.68 NT dollars in non-Aborigines).

We examined the factors affecting medical injection frequency when the children visited a medical practitioner using logistic regression analysis (Table 4). We classified a frequency of <20% as rare and >20% as frequent. The injection frequency reported by respondents was higher in Aboriginal children, in older children, in children whose parents preferred injection to other medication and in children who did not have insurance coverage. Injection frequency was also found to depend on whether there was a doctor's prescription.

TABLE 1 *Socio-demographic charateristics of the Taiwanese Aboriginal and non-Aboriginal children*

| | Aborigines (%) $n = 316$ | Non-Aborigines (%) $n = 580$ | *P*-value |
|---|---|---|---|
| Gender | | | |
| Male | 161 (51.77) | 295 (51.22) | |
| Female | 150 (48.23) | 281 (48.78) | 0.87 |
| Age (years) | 5.87 ± 0.21 | 5.62 ± 0.16 | 0.34 |
| Questionnaire respondents | | | |
| Children's parents | 251 (79.94) | 451 (77.89) | |
| Children's grandparents | 36 (11.46) | 89 (15.37) | |
| Others | 27 (8.60) | 39 (6.74) | 0.19 |
| National health insurance | | | |
| Yes | 250 (79.37) | 530 (91.54) | |
| No | 65 (20.63) | 49 (8.46) | <0.01 |
| Parents' education | | | |
| Both <9 years | 175 (57.76) | 176 (31.32) | |
| One >9 years | 80 (26.40) | 201 (35.77) | |
| Both >9 years | 48 (15.84) | 185 (32.92) | <0.01 |

TABLE 2 *Medical behaviour of the parents on behalf of their children*

| | Aborigines (%) $n = 316$ | Non-Aborigines (%) $n = 580$ | *P*-value |
|---|---|---|---|
| Location of physician | | | |
| Outside the community | 159 (52.28) | 162 (40.30) | |
| Within the community | 154 (47.72) | 240 (59.70) | <0.01 |
| Visit the physician immediately when children are sick | | | |
| Yes | 259 (82.48) | 503 (87.78) | |
| No | 55 (17.52) | 70 (12.22) | <0.05 |
| Preferred medication | | | |
| Drug store without physician | 9 (2.89) | 15 (2.64) | |
| Western medicine | 298 (95.82) | 537 (94.38) | |
| Traditional medicine and herbalist | 2 (0.64) | 13 (2.28) | |
| Others | 2 (0.64) | 4 (0.70) | 0.35 |
| Travel time | | | |
| <30 min | 174 (55.24) | 447 (77.47) | |
| 30–60 min | 102 (32.58) | 117 (20.28) | |
| >60 min | 39 (12.38) | 13 (2.25) | <0.01 |
| Perceived conveniece of medical service | | | |
| Convenient | 193 (61.66) | 401 (69.38) | |
| Inconvenient | 120 (38.34) | 177 (30.62) | <0.05 |
| Evaluation of children's health status | | | |
| Good | 190 (60.70) | 371 (63.97) | |
| Normal | 95 (30.35) | 175 (30.17) | |
| Bad | 28 (8.95) | 34 (5.86) | <0.05 |
| The importance of distance | | | |
| Very impotant | 77 (24.37) | 89 (15.34) | |
| Important | 45 (14.24) | 65 (11.21) | |
| Unimportant | 9 (2.85) | 21 (3.62) | |
| Very unimportant | 145 (58.54) | 405 (69.83) | <0.01 |
| Perceived effect of medical injection compared with medicine | | | |
| Better | 91 (29.26) | 241 (41.62) | |
| Worse | 54 (17.36) | 124 (21.42) | |
| Uncertain | 166 (53.38) | 214 (36.96) | 0.05 |
| Frequency of medical injection | | | |
| Every time (>80%) | 52 (17.05) | 38 (6.67) | |
| Often (50–80%) | 22 (7.21) | 49 (8.60) | |
| Sometimes (20–50%) | 102 (33.44) | 153 (26.84) | |
| Rarely (<20%) | 129 (42.30) | 330 (57.89) | <0.01 |

TABLE 3 *Health status and physician utilization of the children*

| | Aborigines (%) $n = 316$ | Non-Aborigines (%) $n = 580$ | *P*-value |
|---|---|---|---|
| Acute illness in the last month | | | |
| Yes | 133 (42.09) | 248 (42.76) | |
| No | 183 (57.91) | 322 (57.24) | 0.85 |
| Mean frequency of acute disease in the last month | 0.67 ± 0.07 | 0.63 ± 0.04 | 0.59 |
| | Aborigines ($n = 133$) | Non-Aborigines ($n = 248$) | |
| Physician utilization by ill children in the last month | | | |
| Physician visit utilization | | | |
| Yes | 125 (93.98) | 234 (94.35) | |
| No | 8 (6.02) | 14 (5.65) | 0.75 |
| Mean frequency of physician utilization in the last month | 1.86 ± 0.15 | 1.79 ± 0.08 | 0.7 |
| Average physician cost in the last month | 357.26 ± 41.59 | 270.68 ± 15.36 | 0.05 |

The 351 sick children were divided into two groups according to their race, and linear regression was used to examine the factors affecting the frequency of physician utilization in the preceding month (Table 5). For non-Aboriginal children ($n = 230$), the frequency of visits to the doctor depended only on the frequency of sickness. For Aboriginal children ($n = 121$), the frequency of visits to the doctor depended not only on sickness, but also on travel time and their parents perceived importance of the travel distance. The results indicate that if the physician was located too far away or the parents thought the travel distance was an important factor when choosing the location of physician, then the Aboriginal children will utilize the physician less.

A total of 351 of the sick children were included in a multivariate regression analysis, which was used to identify the factors that parents selected regarding a medical practitioner based outside the community in the preceding month (Table 6). The results indicated that the location of the physician who the parents chose for their children was related to Aboriginal status, whether the parents regard distance as an important factor when choosing a physician, considering that it is not convenient

TABLE 4 *Factors related to medical injection*

| Variables | Often[a] | Rarely[a] | OR | 95% CI | AOR | 95% CI |
|---|---|---|---|---|---|---|
| Ethnicity | | | | | | |
| Non-Aborigines | 240 (57.69) | 330 (71.90) | 1.00 | | 1.00 | |
| Aborigines | 176 (42.31) | 129 (28.10) | 1.87 | 1.42–2.49** | 2.10 | 1.36–3.24** |
| Children's age | | | | | | |
| <4 years old | 108 (26.60) | 186 (41.89) | 1.00 | | 1.00 | |
| 4–6 years old | 98 (24.14) | 111 (25.00) | 1.50 | 1.06–2.14* | 1.42 | 0.97–2.08 |
| 7–9 years old | 85 (20.94) | 68 (15.32) | 2.13 | 1.44–3.15** | 2.06 | 1.35–3.15** |
| >10 years old | 115 (28.33) | 79 (17.79) | 2.48 | 1.72–3.57** | 2.30 | 1.51–3.50** |
| Parents' education | | | | | | |
| Both <9 years | 191 (48.35) | 153 (34.00) | 1.00 | | 1.00 | |
| One >9 years | 104 (26.33) | 121 (14.32) | 0.69 | 0.49–0.96* | 1.00 | 0.68–1.48 |
| Both >9 years | 100 (25.32) | 176 (39.11) | 0.46 | 0.33–0.63** | 0.72 | 0.48–1.06 |
| Medical injection is | | | | | | |
| Required by parents | 34 (8.19) | 62 (13.60) | 1.00 | | 1.00 | |
| Physician's prescription | 381 (91.81) | 394 (86.40) | 1.76 | 1.13–2.74* | 1.84 | 1.11–3.05* |
| Perceived effect of injection compared with medicine | | | | | | |
| Better | 176 (42.62) | 149 (32.60) | 1.00 | | 1.00 | |
| Uncertain | 180 (43.58) | 191 (41.79) | 0.80 | 0.59–1.08 | 0.73 | 0.53–1.02 |
| Worse | 57 (13.80) | 117 (25.60) | 0.41 | 0.28–0.61** | 0.41 | 0.27–0.63** |
| Family income (NT dollars) (× 10 000/month) | | | | | | |
| <20 | 173 (41.59) | 147 (32.03) | 1.00 | | 1.00 | |
| 20–40 | 138 (33.17) | 174 (37.91) | 0.67 | 0.49–0.82* | 0.56 | 0.39–0.80** |
| 40–60 | 77 (18.51) | 94 (20.48) | 0.70 | 0.47–1.01# | 0.85 | 0.56–1.31 |
| >60 | 28 (6.73) | 44 (9.59) | 0.54 | 0.32–0.91* | 0.64 | 0.34–1.18 |
| National health insurance | | | | | | |
| No | 67 (16.11) | 35 (7.63) | 1.00 | | 1.00 | |
| Yes | 349 (83.89) | 424 (92.37) | 0.43 | 0.28–0.66** | 0.60 | 0.37–0.97* |

OR: odds ratio $^{**}P < 0.01$; $^{*}P < 0.05$; $^{\#}0.05 < P < 0.1$.
AOR: adjusted odds ratio $^{**}P < 0.01$; $^{*}P < 0.05$; $^{\#}0.05 < P < 0.1$.
[a]Often receiving an injection is defined as a frequency of >20%; rarely is defined as a frequency of <20%.

TABLE 5 *Factors related to the frequency of physician utilization of the two groups in the previous month*

| Variables | Aborigines (%) $n = 121$ | | Non-Aborigines (%) $n = 230$ | |
|---|---|---|---|---|
| | β coefficient | SE | β coefficient | SE |
| **Predisposing component** | | | | |
| Age (years) | –0.003 | 0.004 | 0.001 | 0.004 |
| No. of children in family | 0.03 | 0.03 | 0.03* | 0.01 |
| Marital status | | | | |
| Married | – | – | – | – |
| Other[a] | –0.05 | 0.04 | –0.07 | 0.07 |
| **Enabling component** | | | | |
| Family income (× 10 000/month) | | | | |
| <20 | – | | – | |
| 20–40 | –0.01 | 0.04 | 0.05 | 0.03 |
| 40–60 | 0.01 | 0.05 | 0.01 | 0.03 |
| >60 | 0.11 | 0.06 | 0.04 | 0.04 |
| National health insurance | | | | |
| Yes | – | | – | |
| No | –0.05 | 0.04 | –0.01 | 0.04 |
| Importance of travel distance | | | | |
| Unimportant | – | | – | |
| Important | –0.12* | 0.05 | –0.001 | 0.05 |
| Perceived convenience of medical service | | | | |
| Convenient | – | | – | |
| Inconvenient | –0.02 | 0.03 | –0.03 | 0.04 |
| Travel time | | | | |
| <30 min | – | | – | |
| 30–60 min | –0.01 | 0.04 | 0.02 | 0.03 |
| >60 min | –0.10* | 0.54 | –0.04 | 0.06 |
| **Need component** | | | | |
| Perception of children's health | | | | |
| Good | – | | – | |
| Normal | 0.04 | 0.03 | –0.02 | 0.02 |
| Bad | 0.02 | 0.05 | 0.08* | 0.03 |
| Frequency of illness | 0.09** | 0.01 | 0.06** | 0.01 |
| $R^2$ | 0.60 | | 0.33 | |

**$P < 0.01$; *$P < 0.05$.
[a]Included divorced, separated or widowed.

for their children to have visits to a physician, and having more than four visits to a physician during the previous month.

## Discussion

There has been considerable research concerning ethnicity and the use of health services. Most of these were focused on specific diseases, such as asthma or CHD (coronary heart disease), and some of these studies focused on older people.[6] However, in our study, we focused on children, and our interest was in the comprehensive physician service utilization.

It is generally assumed that Aborigines are somewhat underprivileged in terms of the health care services they receive. This is believed to be due to aspects such as remote living areas, low income, absence of medical practitioners, large distances to service providers and other social and cultural barriers. This study was a community-based survey of illness experience and health-seeking behaviour. We identified the factors affecting the utilization of medical services and compared the factors affecting Aboriginal children with those affecting non-Aboriginal children.

Only ~80% of Aboriginal children in this study were covered by national health insurance, compared with 92.3% of the overall Taiwanese population. However, when we examined the factors affecting the frequency of physician utilization in the preceding month, we found that whether a child was insured or not was not a significant factor affecting their frequency of physician

TABLE 6 *Factors related to the location of the physician who the parents of sick children choose*

| Variables | Outside the community | Within the community | OR | 95% CI | AOR | 95% CI |
|---|---|---|---|---|---|---|
| **Predisposing component** | | | | | | |
| Ethnicity | | | | | | |
| Non-Aborigines | 118 (53.39) | 105 (87.50) | 1.00 | | 1.00 | |
| Aborigines | 103 (46.61) | 15 (12.50) | 6.11 | 3.35–11.16** | 7.80 | 3.95–15.42** |
| Children's age | | | | | | |
| <4 years old | 90 (41.47) | 50 (42.37) | 1.00 | | | |
| 4–6 years old | 37 (17.05) | 31 (26.27) | 1.02 | 0.58–1.77 | – | – |
| 7–9 years old | 37 (17.05) | 19 (16.10) | 1.08 | 0.56–2.06 | – | – |
| >10 years old | 33 (15.21) | 18 (15.25) | 1.01 | 0.52–1.98 | – | – |
| Parents' education | | | | | | |
| Both <9 years | 86 (39.45) | 42 (36.52) | 1.00 | | | |
| One >9 years | 48 (22.02) | 26 (22.61) | 0.90 | 0.49–1.65 | – | – |
| Both >9 years | 84 (38.53) | 47 (40.87) | 0.87 | 0.52–1.46 | – | – |
| **Enabling component** | | | | | | |
| Importance of distance | | | | | | |
| Unimportant | 201 (90.95) | 109 (80.83) | 1.00 | | 1.00 | |
| Important | 20 (9.05) | 23 (19.17) | 0.42 | 0.22–0.80** | 0.29 | 0.13–0.67** |
| Family income (NT) (× 10 000/month) | | | | | | |
| <20 | 58 (26.24) | 42 (35.00) | 1.00 | | | |
| 20–40 | 87 (39.37) | 37 (30.83) | 1.70 | 0.98–2.96# | – | – |
| 40–60 | 53 (23.98) | 33 (27.50) | 1.16 | 0.65–2.10 | – | – |
| >60 | 23 (10.41) | 8 (6.67) | 2.08 | 0.85–5.11 | – | – |
| No. of children in family | | | | | | |
| <2 | 112 (50.68) | 69 (57.50) | 1.00 | | | |
| >2 | 109 (49.32) | 51 (42.50) | 1.32 | 0.84–2.06 | – | – |
| National health insurance | | | | | | |
| No | 27 (12.22) | 12 (10.00) | 1.00 | | | |
| Yes | 197 (87.78) | 108 (90.00) | 0.80 | 0.39–1.64 | – | – |
| Travel time | | | | | | |
| <30 min | 132 (60.00) | 104 (87.39) | 1.00 | | 1.00 | |
| 30–60 min | 74 (33.64) | 10 (8.40) | 5.83 | 2.87–11.84** | 5.35 | 2.51–11.40** |
| >60 min | 14 (6.36) | 5 (4.20) | 2.21 | 0.77–6.32 | 1.60 | 0.49–5.28 |
| **Need component** | | | | | | |
| Perceived conveniece of medical service | | | | | | |
| Convenient | 136 (38.46) | 92 (76.67) | 1.00 | | 1.00 | |
| Inconvenient | 85 (61.54) | 28 (23.33) | 2.05 | 1.24–3.39** | 1.73 | 0.95–3.13 |
| Perception of children's health | | | | | | |
| Good | 115 (52.04) | 65 (12.50) | 1.00 | | | |
| Normal | 83 (37.56) | 40 (33.33) | 1.17 | 0.72–1.90 | – | – |
| Bad | 23 (10.41) | 15 (54.17) | 0.87 | 0.42–1.78 | – | – |
| Frequency of visits | | | | | | |
| 1 | 99 (44.80) | 57 (42.54) | 1.00 | | 1.00 | |
| 2–3 | 92 (41.63) | 56 (41.80) | 0.95 | 0.59–1.51 | 0.97 | 0.56–1.67 |
| >4 | 30 (13.57) | 21 (15.67) | 2.47 | 1.02–5.98* | 1.68 | 0.64–4.40 |

OR, odds ratio; AOR, adjusted odds ratio: $^{**}P < 0.01$; $^{*}P < 0.05$; $^{\#}0.05 < P < 0.1$.

utilization. The situation was the same in both Aboriginal and non-Aboriginal children. This frequency for ill Aboriginal children was on average 1.86 visits in the preceding month, as compared with 1.79 visits/month for the average ill non-Aboriginal child. The difference was not statistically significant. However, the average monthly cost of physician visits was a little higher for Aboriginal than for non-Aboriginal ill children. This may have been due partly to the relatively low rate of national health coverage for Aboriginal children, whose parents therefore more often had to finance the visit themselves.

More than 80% of parents stated that they would take their children to a medical practitioner as soon as they were sick. However, we found that this ratio was slightly less for Aboriginal parents than for non-Aborigines. It was thought that differences in the parents' perception of how serious the child's illness was may result in a difference in utilization of medical services,[7] and cultural differences between Aboriginal and non-Aboriginal

parents might cause the differences when they treat their children's illness.

Numerous publications have stressed the importance of 'need' as a factor affecting medical service utilization.[10,11] The frequency of children's illnesses and parents' perception of their children's health status were indices used to evaluate the need component. Perceived health status is a highly subjective index, while the utilization of out-patients service is a self-determined health service.[12,13] Therefore, the subjective index may be an important factor affecting health service utilization. For the analysis described in the following paragraph, multiple linear regression was used to define the factors that influenced the frequency of visits to a physician in the preceding month. We also determined the factors related to the Aboriginal and non-Aboriginal children who had visited a physician in the preceding month. Aboriginal parents who had to travel for >60 min to obtain medical services tended to visit the physician relatively less frequently. These parents clearly perceived travel time to the doctor as a hindrance.

Family income and health insurance coverage have been found to be significant factors affecting the utilization of medical services in previous studies.[10,11,14,15] In the present study, neither income nor insurance coverage appeared to influence physician utilization. However, this might be because national health insurance has eliminated the economic barriers to medical service utilization for most people. However, some problems arise when comparing Aborigines and non-Aborigines at the same level of income without adjustment for differences in family size, purchasing power and property, all of which would tend to accentuate racial inequality in income.[1] Modern parents would rate their children's health status very highly because they have fewer children than past parents; modern parents took their offspring to the doctor as soon as they were sick. However, in our study, no factors other than need seemed to affect the utilization of medical services by non-Aboriginal children.

The preference for physicians located outide the community and for types of medication were set as indices for measuring the accessibility of medical services.[7,17] We believe that alternative treatments such as traditional folk medicines were substituted for western medicines only if the latter were difficult to access. Decades ago, the Taiwanese Aborigines used traditional folk medicine, such as herbal and shamanistic methods for treatment of their diseases. However, over the last 100 years, western missionaries travelled to some remote areas to help the Aborigines. These missionaries constructed churches and provided medical services. They preached religion and introduced modern medicine into the Aboriginal community. There is no research that evaluates any drastic changes to Taiwan Aborigines' medication within the past 100 years. In our study, 95% of all the Aboriginal parents stated that they prefer western medicine as the primary medication for their children. Although it was more inconvenient for the Aborigines to access western medical services, this did not affect the choice of medication chosen by the Aboriginal households and the frequency with which they used medical facilities. We also found that Aboriginal parents have changed their medical attitude with regard to their children and this may reflect the fact that modern parents have more confidence in western medicine.

A comparison of the medicines which different households choose for their children did not reflect the disparity of medical services availability for the two groups. The percentage of Aboriginal households (52.3%) opting for physicians located outside the community was higher than that for non-Aboriginal households. This was because medical services in Aboriginal communities are rarely available, so residents often have to travel quite far to visit a doctor. When comparing the two study groups, the proportion of non-Aborigines who could receive medical services with 30 minutes or less of travel time was much higher than for Aborigines. Thus taking travel time and physician location into consideration, access to medical services for Aborigines was clearly worse than that for non-Aborigines.

Logistic regression analysis revealed some factors that influenced whether parents had taken their children to a physician who practised outside the community in the preceding month. This choice seemed to depend on ethnicity groups, travel distance to the usual source of medical care and the perceived convenience of a medical services provider. As well as finance and distance access problems, there were some other factors affecting the selection of physician location relating to ethnicity, such as cultural background, reliance and communication problems.[18] In fact, a study by Luft indicated that travel time is not an important determinant of utilization.[19] The study also found that travel time is generally positively, rather than negatively, related to utilization. In Taiwan, communication problems were not a factor in the difference in Aboriginal and non-Aboriginal children's physician utilization. The distance problem might be the major problem in medical service seeking for Aboriginal children. However, further study is required in order to find out why parents prefer to spend longer travelling to distant physician locations. Clearly Aboriginal areas are less well provided with medical services than the rest of Taiwan.

The 57.70% frequency with which medical injections had been given to Aboriginal children during a visit to a doctor in this study was not dissimilar to frequencies reported in Ko's paper nearly 10 years ago.[20] However, it was a little higher than the frequency for non-Aboriginal children in the present study (57.70 versus 42.1%).

We found that the frequency of medical injections was associated significantly with the following risk factors: being an Aborigine, an older child, parents having confidence in the effect of the injection, no insurance

coverage and a doctor's prescription. Children whose parents considered injections to be superior to other forms of medication were given more medical injections than others. However, one of the most significant risk factors related to injection frequency was the doctor's prescription.

Taiwan is a well-known hyperendemic area for hepatitis B virus (HBV) infection.[21] The incidence of HBV infection among Aboriginal Taiwanese[21] was found to be considerably higher than among non-Aborigines, as was that of HCV infection,[22] both of which were thought to be associated with medical injections given under non-hygienic conditions. Medical injection is not only an important risk factor of HBV and HCV infection, but also of gluteal fibrotic contracture.[23] In this study, Aboriginal children received injections more frequently than their non-Aboriginal counterparts. The extraordinarily high incidence of hepatitis among Aboriginal Taiwanese urgently needs to be remedied.

There were some difference in the factors affecting medical care utilization among Aboriginal and non-Aboriginal children. In our study, the most important factor affecting utilization was access to medical resources. Insurance coverage and ethnicity did not impact on the frequency of medical care utilization. It seems that economic and cultural barriers do not exist in the children's medical care utilization, and are the same for non-Aboriginal and Aboriginal children. This may be due to the fact that modern parents have a higher education level and fewer children, so that they value their children's health status, and most parents prefer modern medicine for their children. Access to medical resources is still a major problem in Aboriginal areas, and the government must make more effort to improve the distribution of medical resource, especially in Aboriginal regions.

Recently, the government has paid more attention to the problem of medical resources among Aboriginal communities, and plans to provide a travel subsidy for people living in distant Aboriginal areas. However, the Aborigines still want the government to provide physicians and equipment in their own communities.

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