

Behavioral Changes Associated with Economic Development in the South Pacific: Health Transition in Vanuatu

DANCAUSE et al. (2011)

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This paper was read by M. Umezaki
on 15 May 2012 at the HE Dept meeting

Health patterns are changing in developing countries; as diet and activity patterns change with economic development, chronic disease prevalence increases, which is a characteristic of health transition. The islands of Vanuatu (South Pacific) have varying rates of economic development and provide a natural experimental model of health transition. **Objectives:** To characterize behavioral changes associated with modernization. **Methods:** We surveyed 425 children and 559 adults on three islands varying in degree of economic development. We assessed diet (24-h dietary recall), physical activity (mode of transport, work activities, and recreation), substance use, and other behavioral patterns. **Results:** Spending patterns and access to Western foods followed modernization gradients in our sample, whereas occupational patterns and ownership of technological goods were poor markers of modernization. With increasing economic development, participants consumed more animal proteins and simple carbohydrates. Physical activity levels were high; most participants were active in gardening, and sports were popular, especially in urban areas. However, urban participants spent more time in sedentary recreation. Men's use of alcohol and tobacco increased with economic development, but we observed marked differences in substance use patterns between two rural islands—one with and one without tourism. **Conclusions:** Economic development in Vanuatu is accompanied by nutrition transition and increased sedentary recreation, although physical activity levels remain high. Differences in substance use patterns between rural islands with and without tourism indicate a need for more research in rural areas. These findings might inform research in other communities in the early stages of health transition.

Introduction

- Multiple burdens of “health transition” in Pacific Island nations

Infectious diseases →

CVD & DM ↑

Psychosocial illness (e.g., alcoholism, depression) ↑

.. Because of changes in diet, physical activity and culture

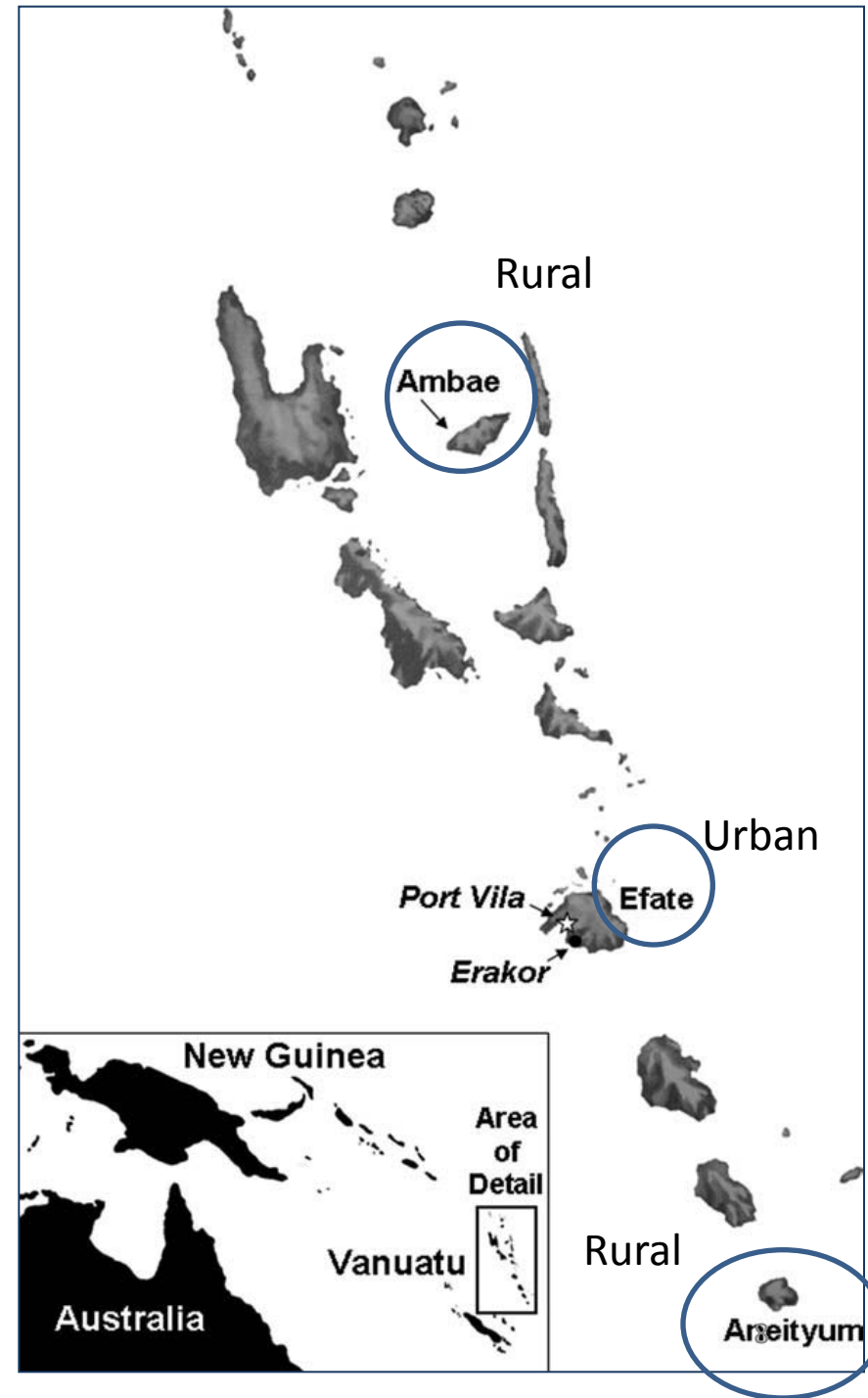
Vanuatu

Few cases of CVD until 1980s
CVD cases in urban areas in the 1990s

A case of “health transition” at the initial stage

	Rural	Urban
	Subsistence	Cash economy
CVD	low	high
Obesity	low	high
DM	low	high

Behavioral changes that were associated with economic development?



Materials and Methods

Fieldwork: June-July 2007

Six villages on three islands (i.e., Ambae <rural>, Aneityum <intermediate>, Erakor <urban>)

*TABLE 1. Rural and urban demographic characteristics
(all inhabited islands) based on 1999 Vanuatu census*

	Urban	Rural	Total population
Population <15 yrs	14,205	63,204	77,409
Population 15–59 yrs	23,135	71,564	94,699
Population ≥60 yrs	880	8,291	9,172
Median age	21.0	18.1	18.8
Life expectancy at birth: Males	69.5	64.4	65.6
Life expectancy at birth: Females	74.2	67.4	69.0

TABLE 2. *Sample and island characteristics of the present study*

Sample Characteristics	Island (villages)		
	Ambae (Redcliff, Sakau)	Aneityum (Anelcauhat, Port Patrick, Umej)	
Children (ages 7–17)	Male	42	106
	Female	43	105
	Total	85	211
Adults (\geq age 18)	Male	51	166
	Female	77	172
	Total	128	338
Island sample size		213	549
Malaria endemicity	Mesoendemic		Eradicated in 1991
Level of economic development in 2007	Low		Moderate
Area population size based on 1999 census	South Ambae		Aneityum (all villages)
	967		821

Sample Characteristics	Efate (Erakor)	
Children (ages 7–17)	Male	53
	Female	76
	Total	129
Adults (\geq age 18)	Male	69
	Female	24
	Total	93
Island sample size		222
Malaria endemicity	Low in urban areas	
Level of economic development in 2007	High	
Area population size based on 1999 census	Erakor	
	977	

Ambae (AM). A traditional thatched home; one of the rugged roads of Southern Ambae; grass landing field and air terminal. 60km from U.



Aneityum (AT). The terrain is hilly and people might walk several hours to traditional gardens. A cruise ship arrives toward tiny Mystery Island, offshore from the main island. Many families participate in string bands and selling items to tourists. 58000 tourists/year in 2005/06





Efate (EF). Residents of Erakor, a suburb of the capital, can access the city center easily by bus. Families buy food both at grocery stores and at the local openair market.



Behavioral survey (questionnaire):

participants' ancestry;

number of liveborn biological and adopted children; education;

an index of selected household and technological goods;

number and relationships of family members with hypertension, CVD, and obesity;

work and leisure activities (mode of transportation, walking hours);

dietary patterns (24h recall + FQ for animal protein diet);

food expenditures;

and substance use patterns (e.g., tobacco, alcohol, Kava <*Piper methysticum*>).

RESULTS

1. No. live born children (N.S.)

AM: 4.2, AT: 4.2, EF: 3.6 (all women)

AM: 5.5, AT: 5.9, EF: 4.3 (45y+ women)

2. Education

AM: 5.9, AT: 6.7, EF: 7.6 (men)

($p=0.015$)

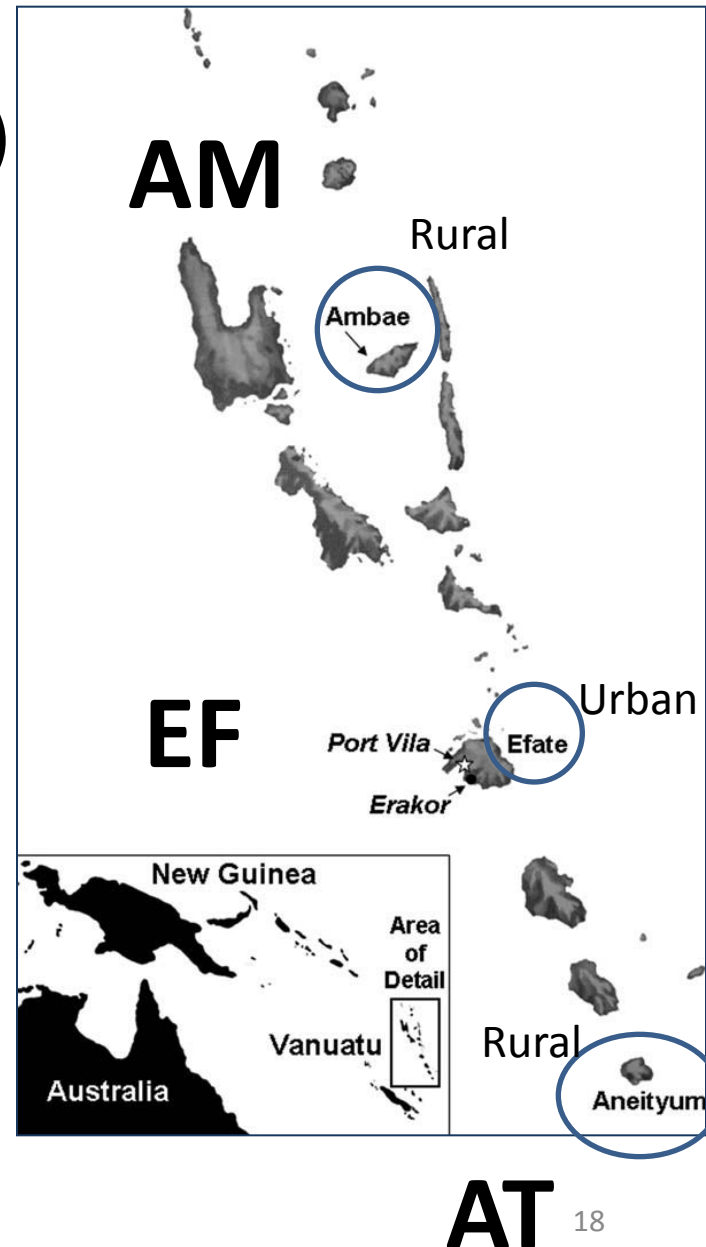
AM: 5.2, AT: 6.1, EF: 7.1

(women)($p=0.021$)

3. Household goods

EF > AM and AT: cars, PC, refrigerator,
TV, mobile phone

EF > AT > AM: radio



4. Diseases

AM: 20%, AT: 35%, EF: 45%

(Hypertension or CVD) ($P < 0.001$)

AM: 25%, AT: 48%, EF: 40%

(overweight/obesity) ($P < 0.001$)

2. Work activity

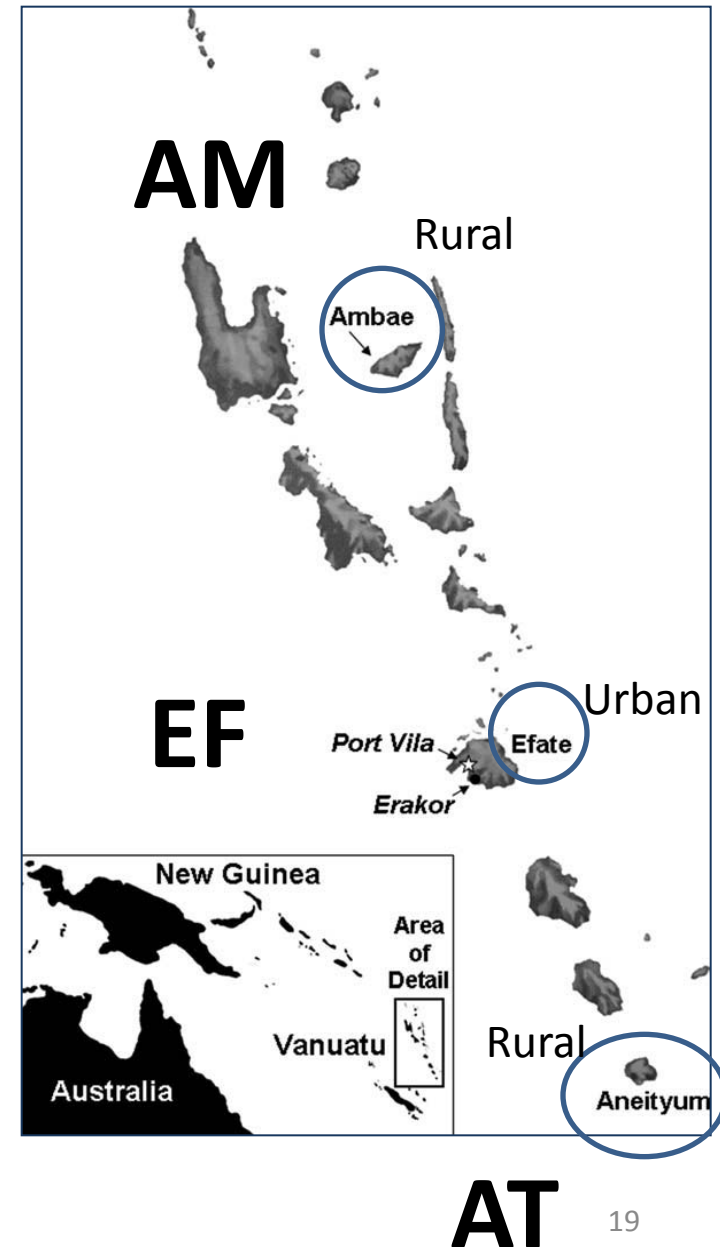
Gardening/housekeeping

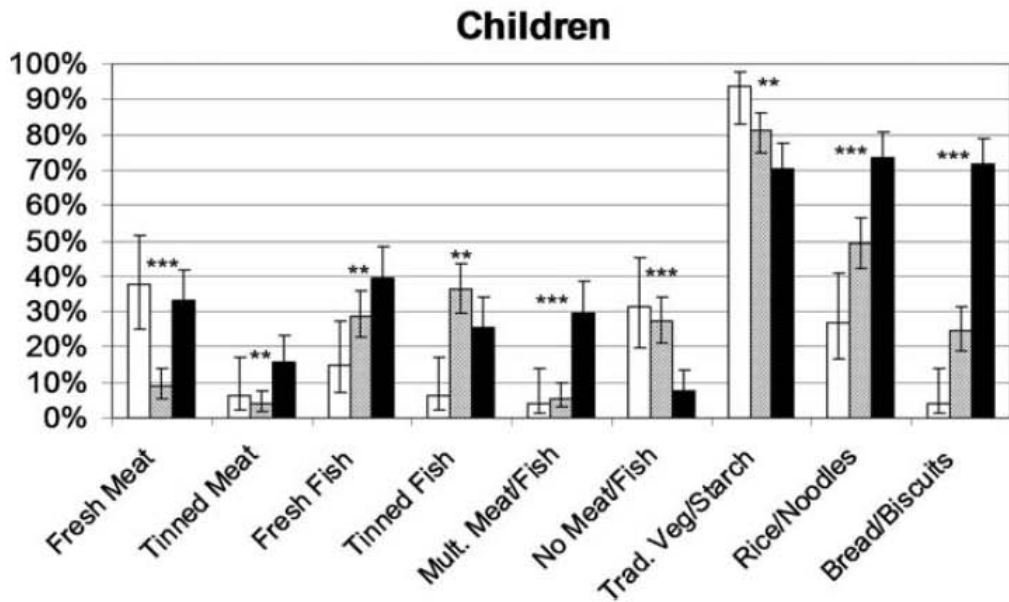
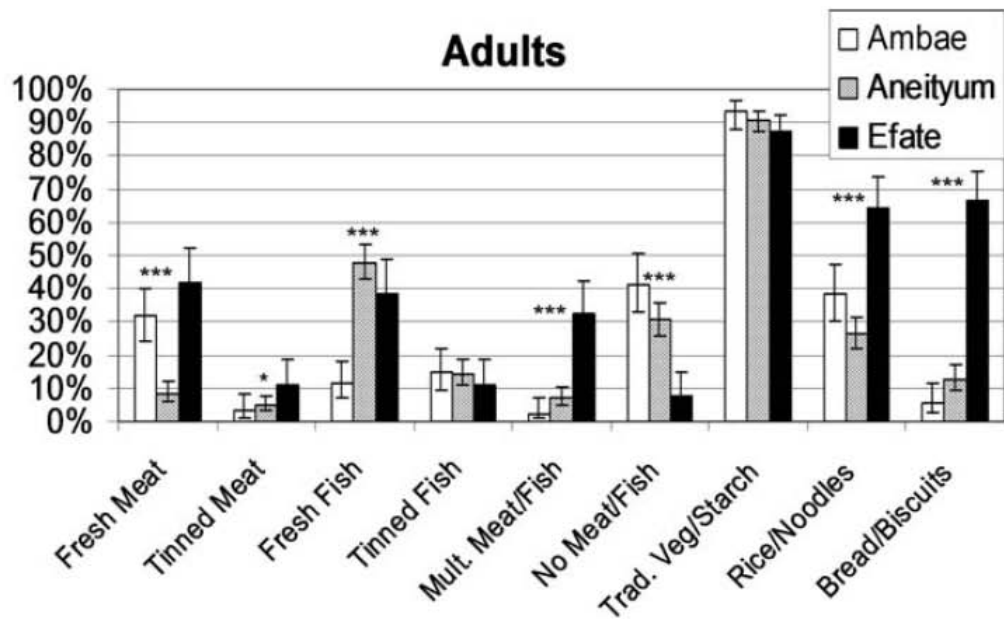
AM: 90%, AT: 84%, EF: 61% (men)

AM: 100%, AT: 88%, EF: 78%

(women)

Tourism-related job in AT and EF





Diet – 24h recall

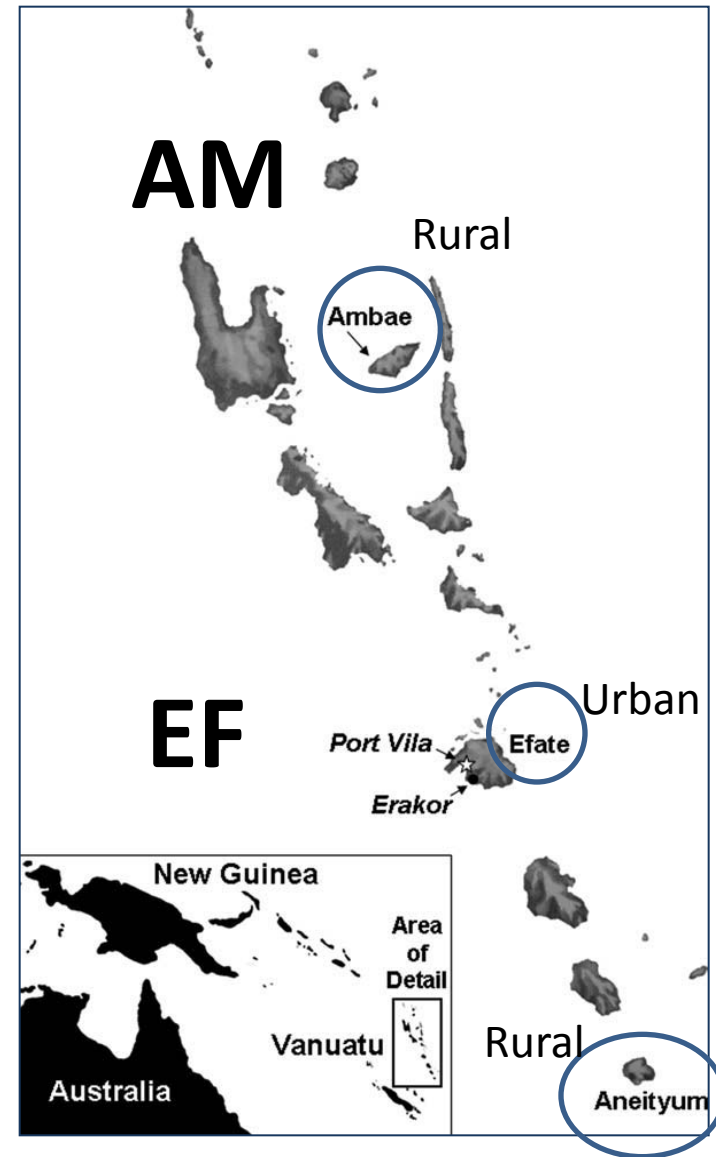


Fig. 3. Twenty-four hour dietary recalls by island. Bars indicate 95% confidence intervals. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

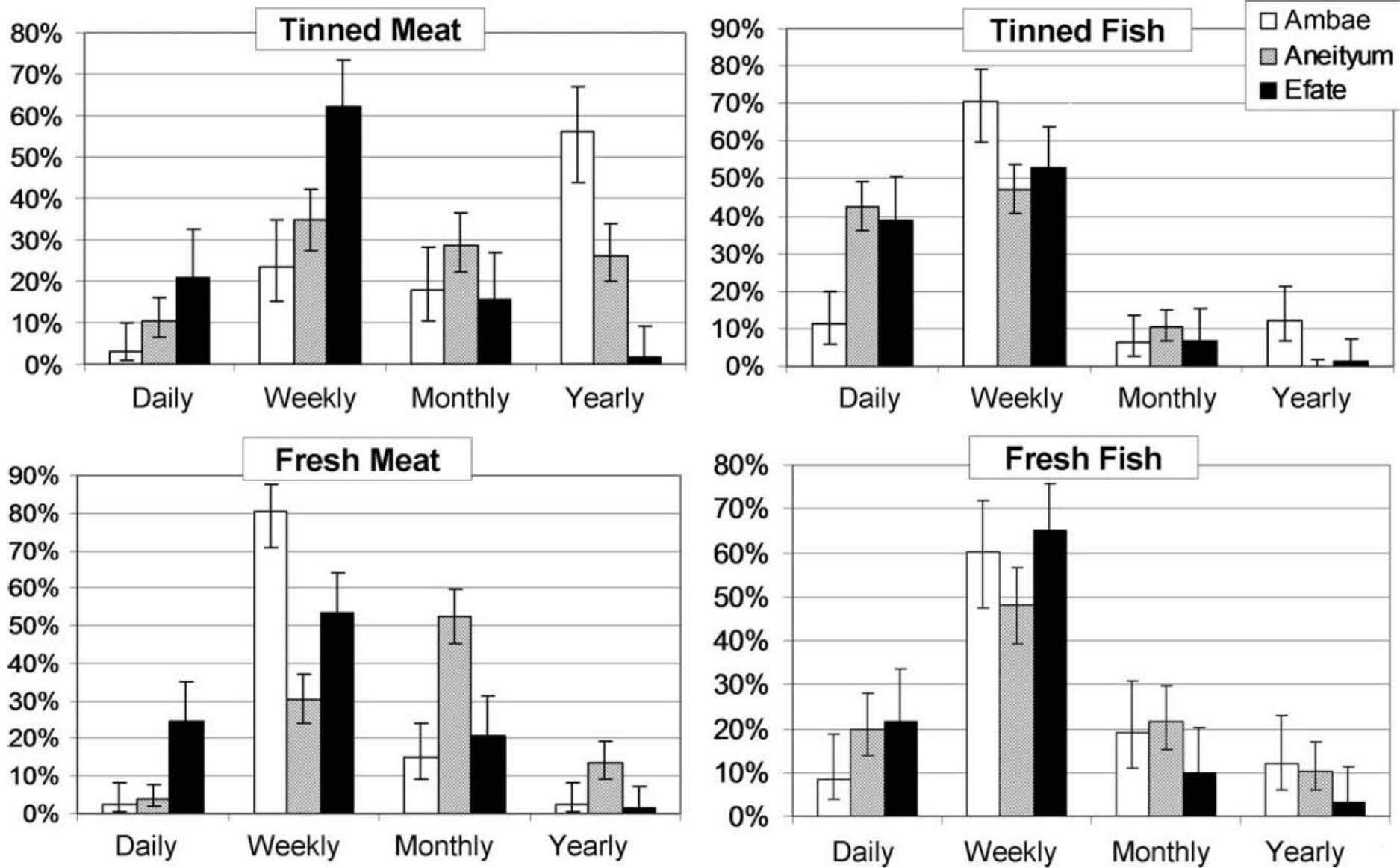


Fig. 4. Frequency of adult fish and meat consumption by island. Bars indicate 95% confidence intervals.

AM
 bananas (74%),
 Manioc (45%),
 taro (36%),
 chicken (32%),
 island cabbage (30%),
 rice (30%),
 yam (21%),
 laplap (15%),
 fresh fish (15%),
 tinned fish (15%)

EF
 Donuts (43%),
 bread (35%),
 cookies (30%),
 Chips (23%),
 lemonade (20%),
 candy (18%),
 Fruit (13%),
 Rice (11%),
 popsicles (10%),
 bananas (8%).

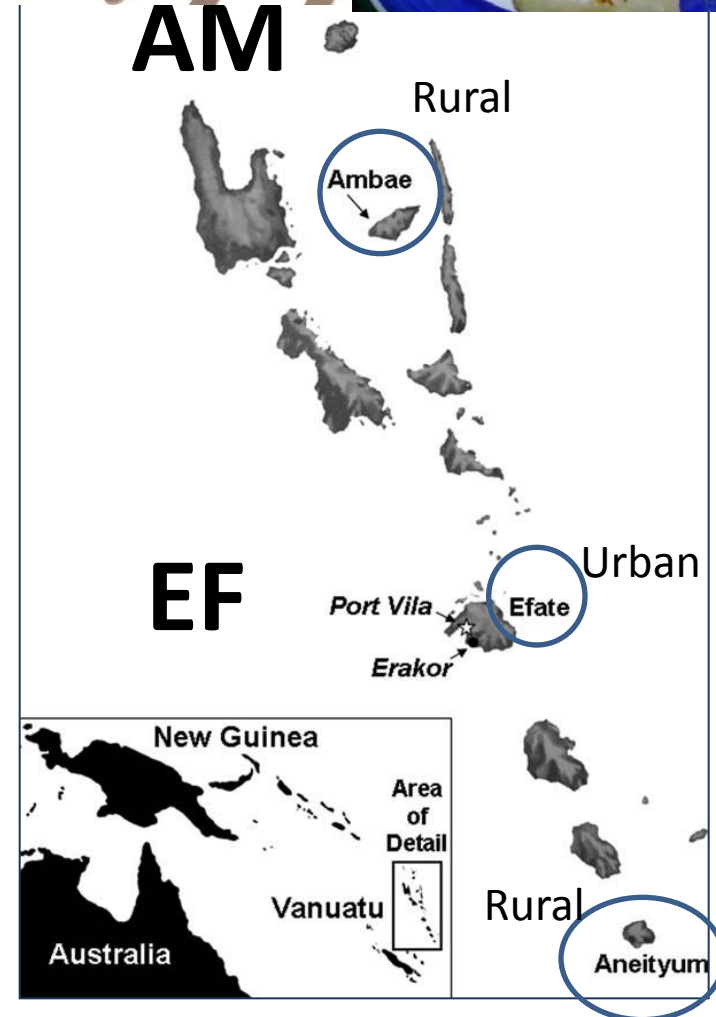
AT
 manioc (51%),
 island cabbage (39%),
 fresh fish (34%),
 taro (33%),
 Rice (28%),
 bananas (20%),
 tinned fish (18%),
 sugarcane (14%),
 yam (11%),
 fruit (including grapefruit,
 oranges, pineapple,
 and pawpaw—10%)



Kid's lunch box



AM



AT

TABLE 3. Adult weekly expenditures on food from stores by island, in vatu

	Ambae ($n = 86$)	Aneityum ($n = 106$)	Efate ($n = 56$)
Mean	867	1,187	3,586
Median	500	1,000	3,000
Range	50–5,000	100–5,000	300–12,000

In 2007, 100 vatu \approx \$1 USD.

4. Physical activity

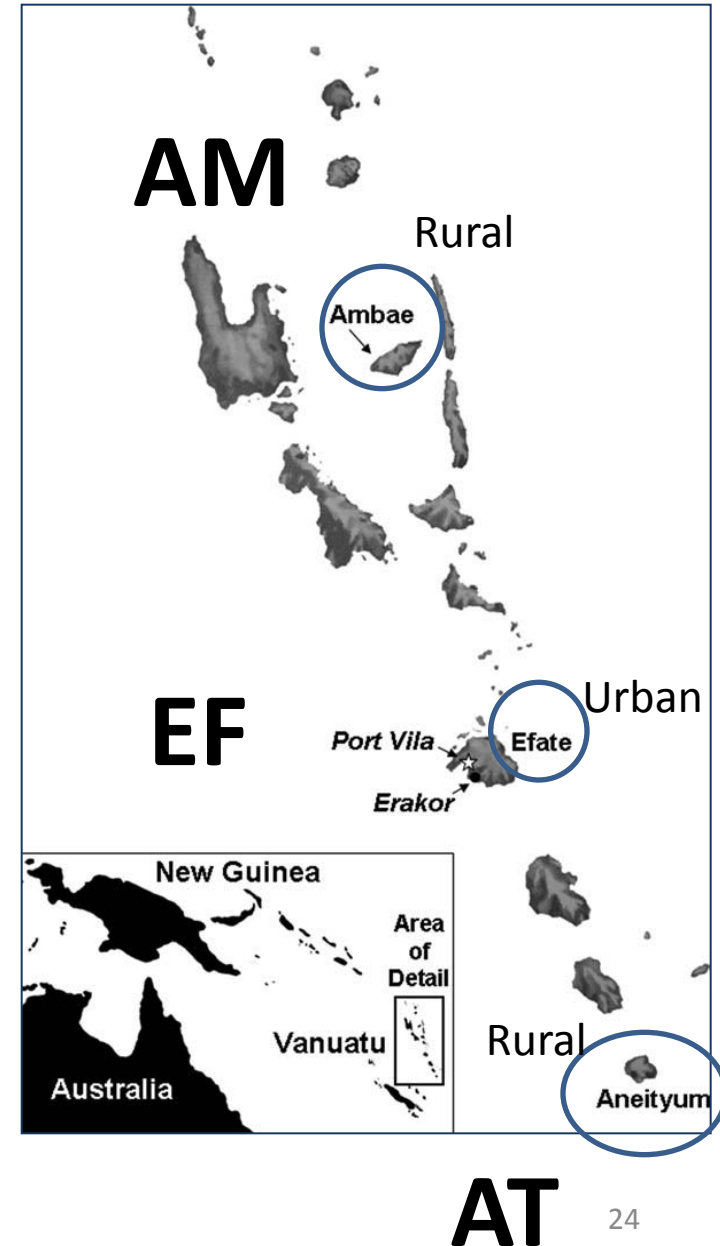
AM: 0%, AT: 3%, EF: 8% (sedentary job, male)

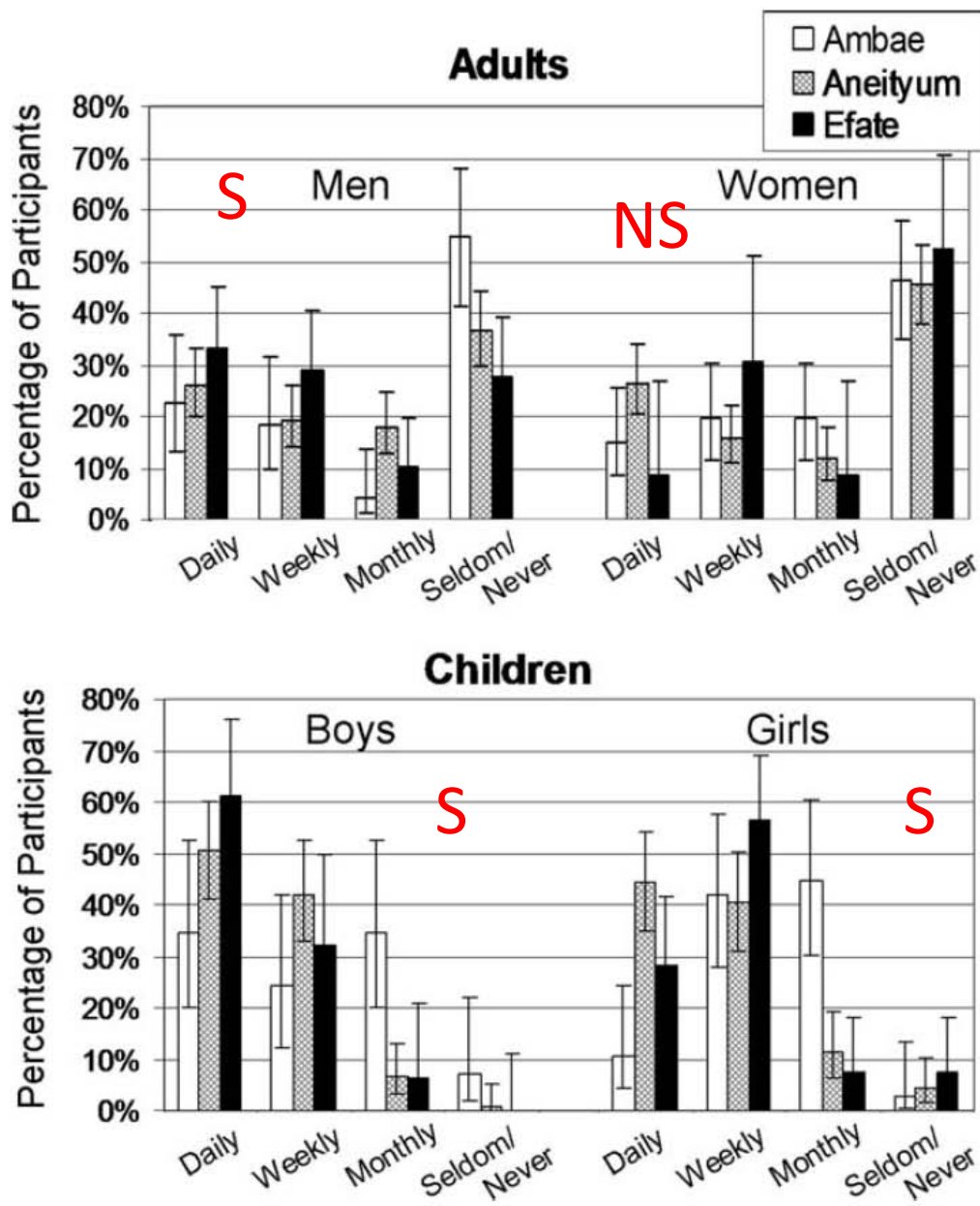
Almost all participants had gardens

2. Transportation

Walking in AM and AT

Car in EF





Watching TV: EF > AM/AT

Fig. 5. Frequency of sports participation by island. Bars indicate 95% confidence intervals.

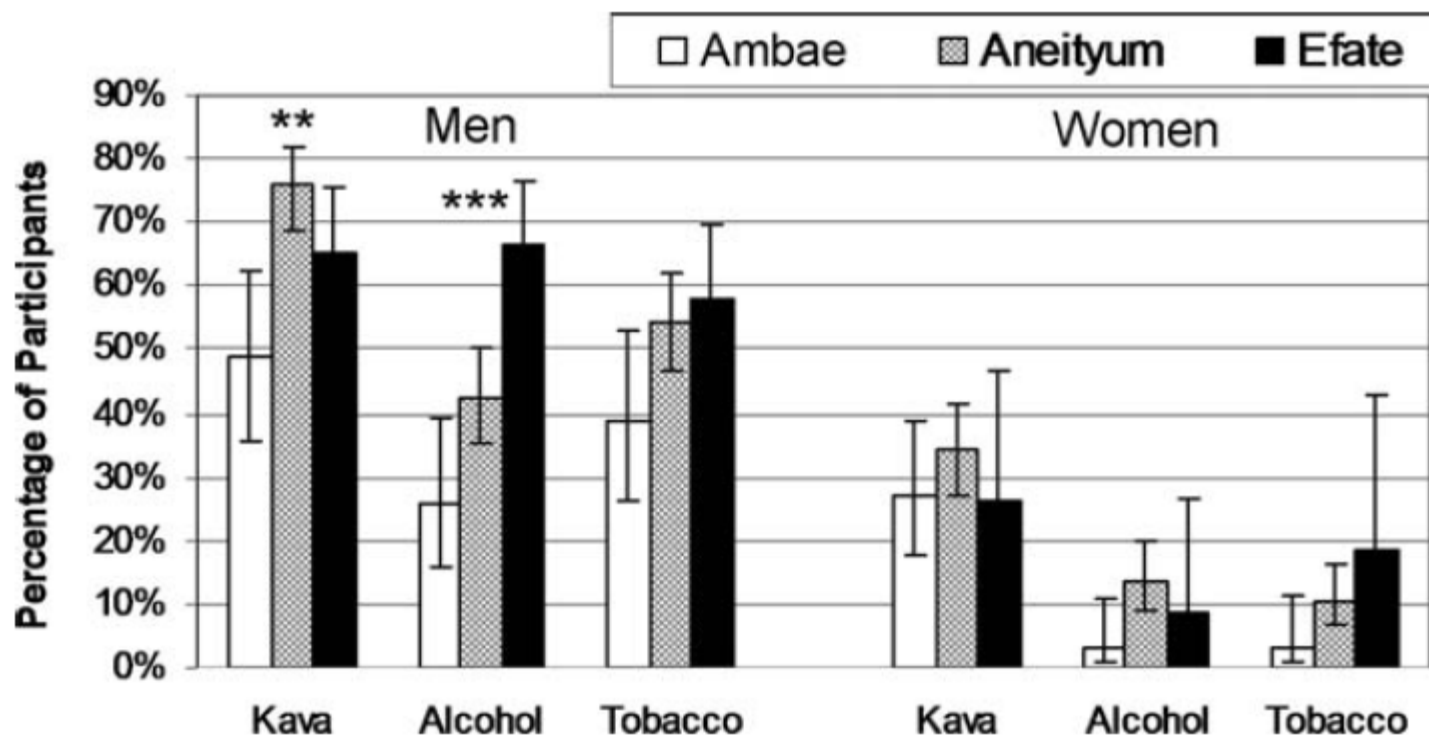


Fig. 6. Adult substance use by island: Prevalence of any use. Bars indicate 95% confidence intervals. ** $P < 0.01$; *** $P < 0.001$. Substance use frequency patterns differed among islands. See Results: Substance Use.

DISCUSSION

Previously reported behavioral indicators of health transition followed modernization gradient? (1)

Ownership of technological goods (Soloway et al., 2009) → No (little variation in rural areas)

Gardening, occupation → No (urban people were involved in gardening)

Education (Page et al., 1977)

→ Yes

Overweight/obesity (reported, in family members) → No (perceived “healthy” body weight is lighter in rural areas than in urban areas; as the people became familiar with “obesity”, their “healthy” body weight increase??)(e.g., becker et al. 2005)

Previously reported behavioral indicators of health transition followed modernization gradient? (2)

Diet → Yes (consumption of/expenditure on Western foods <tin-
meat, bread> increased)

Physical activity → No (rural: garden + walking; urban: garden-
sedentary job – transportation by car + sports)

Substance use: alcohol (men) → yes; tobacco and kava → No
(effect of tourism?)

Global implication of health transition

Double burdens, Obesity↑, central fat distribution↑, energy intake↑, protein intake ↑, store-bought foods↑: in PNG, Samoa, Nauru and many other Pacific countries, also in Mexico, India Gambia ..

For effective intervention strategies,

- (1) Emphasis on dual burdens
- (2) Entire community, not a specific group or setting (because old generations prefer “fat” children)

Enjoy the benefits of economic development

Message

Focusing on modifiable behaviors and preventable risk is critical for people to enjoy the benefits of economic development while minimizing its potentially widespread health burdens.