

## 人類生態班

## ラオス・サバナケット地域農村成人の健康と栄養の生態学

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キーワード：ラオス、身体計測、高血圧、腎臓結石、糖尿病

Health and nutritional ecology of rural adults in SVK

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Key words: Laos, anthropometry, hypertension, kidney stone, diabetes mellitus

## Abstract

Health examination including anthropometry, blood pressure, blood glucose, and urinary dipstick test, was conducted in September 2005, subjecting adult (between 15 and 59 years old) people in 5 of 6 villages in Lahanam, Songkhon district, Savannaket province, Laos. Two hundred twenty two males and four hundred fifty females (six hundred seventy two in total), largely in their 30s and 40s, participated in the study (participation rate of males and females was about 20 and 30 %, respectively). The results are as follows. 1) Anthropometry showed inter-generation difference, which may indicate recent nutritional improvement. 2) Proportion of overweight (BMI>25) and obesity (BMI>30) was higher in females, with generation difference in BMI in both sexes. 3) Proportion of normotension/hypertension increased with ageing in both males and females. About 25% of either systolic or diastolic blood pressure was explained by the multiple regressions with anthropometry as independent variable (body weight, BMI, pulse and age contributed positively and upper arm circumference negatively). 4) Proportion of diabetes mellitus judged by fasting blood glucose was higher in females than in males, and the former reached about 20% in their 50s. 5) Results from urinary dipstick test indicated potentially high prevalence of infections and functional disorder in kidney, kidney stone, in particular. Accumulate logistic regression analysis was conducted to discriminate DM type (dependent variable) with all the measurements (including results of urinary dipstick test) as independent variables, however, significant regression was not obtained partly because few (26) DM cases for 672 subjects. It was concluded that both infectious and chronic diseases exist in adult people in Lahanam area. In order to disclose their attributes, it is needed to examine more critical factors such as food habits, activities, environmental conditions and drug use, which were not treated in this paper.

## Introduction

Information on living and health conditions of the ordinal people has been limited in Lao PDR. The national household surveys conducted since the 1990s showed conflicting results (Kakwani et al., 2002): based on the

first survey (LECS 1), World Bank showed that the Southern region was the poorest with 60% poverty incidence compared to 46% in the North and 40% in the Central; but the second one (Stenflo) concluded that the Northern region was the poorest with 54% of poverty incidence compared to 49% in the South and 37% in the Center; the latest one, the most reliable national survey around 2000 (NIOPH, 2001), has subjected randomly sampled 38,000 and more people (half are females, half are under 15 years old, and 62 % are from rural area) and showed that Southern region has been affected by chronic malnutrition and higher prevalence of female anemia compared with other regions despite higher consumption of fish from Mekong River.

On the other hand, such an ecological study has hardly done that has targeted a whole village and detected health and nutritional problems in situ and examined ecological relationships between them and environmental and socioeconomic conditions within the society. Since 2004, we have carried out health examinations in Lahanam area in Songkhon district, Savannaket province in the South region. The six villages in Lahanam are relatively rich for Lao standard because of textiles of cotton (NIOPH, personal communications), and we have subjected 5 of 6 villages there due to difficult access to the village. Based on main results in the health examination in 2005, this paper aims to measure health and nutritional conditions of the adult people in the five villages, and to relate them with each other.

### Subjects and Methods

Subjecting adult (above 15 years old and less than 60 years old) males and females, the health examination has been carried out in the 5 villages of Lahanam in September 2005. Anthropometry (body height, weight, arm circumference, skinfold thickness of triceps and subscapular), urine test using dipstick paper, measurement of blood sugar by glico-card, and clinical examination including measurements of systolic and diastolic blood pressure were carried out in the old local clinic in the middle of the 5 villages.

Two hundred and twenty two males and four hundred and fifty females (six hundred and seventy two in total) participated in the examination (participation rate of males and females is respectively about twenty percent and about thirty percent; Fig. 1).

### Results

**1. Anthropometry:** Height of males was  $160.3 \pm 6.1$  cm, and that of females was  $150.4 \pm 5.4$  cm, and the latter showed significant generation difference (ANOVA,  $p < 0.05$ ; Fig. 2). Body weight was  $57.7 \pm 9.0$  kg in males, and  $54.5 \pm 9.5$  kg in females, and it showed significant inter-generation variation in both sexes ( $p < 0.001$ ). Thus, BMI of females ( $24.0 \pm 3.8$ ) was higher than that of males ( $22.4 \pm 3.1$ ), and both of them also differed by generation ( $p < 0.001$ ; Fig. 3). Upper arm circumference and skinfold thickness of triceps and subscapular sites showed their peak in the 40s in both males and females with generation difference ( $p < 0.01$ ) except for males

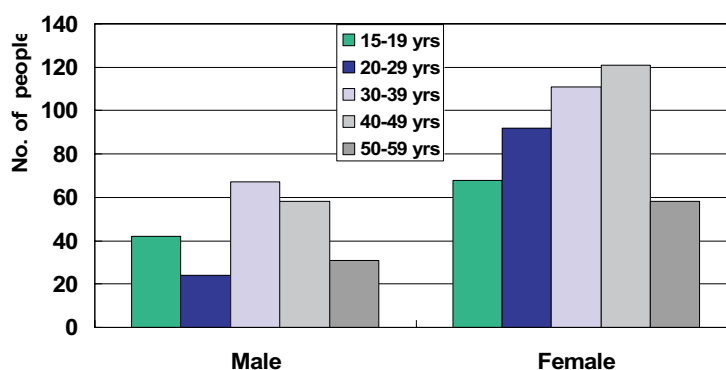


Fig. 1 Age of the subjects by sex

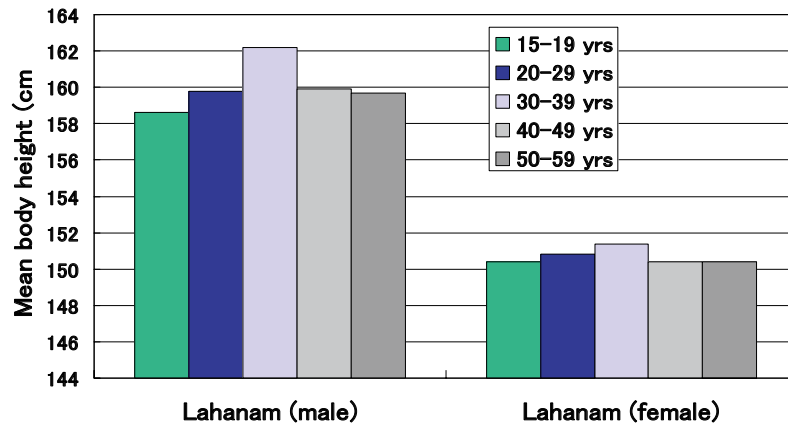


Fig. 2 Body height of Lahanam adults

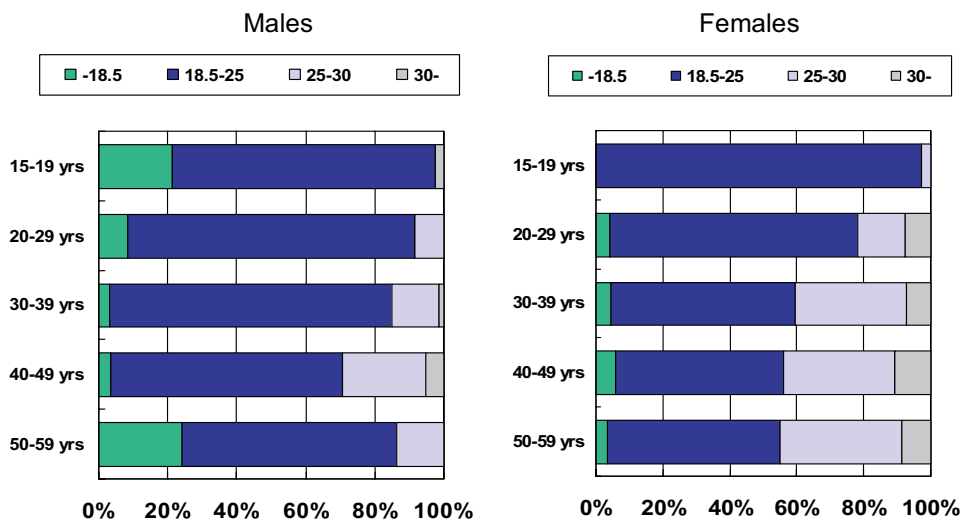


Fig. 3 BMI-category (lean, normal, overweight and obese) by age group and sex

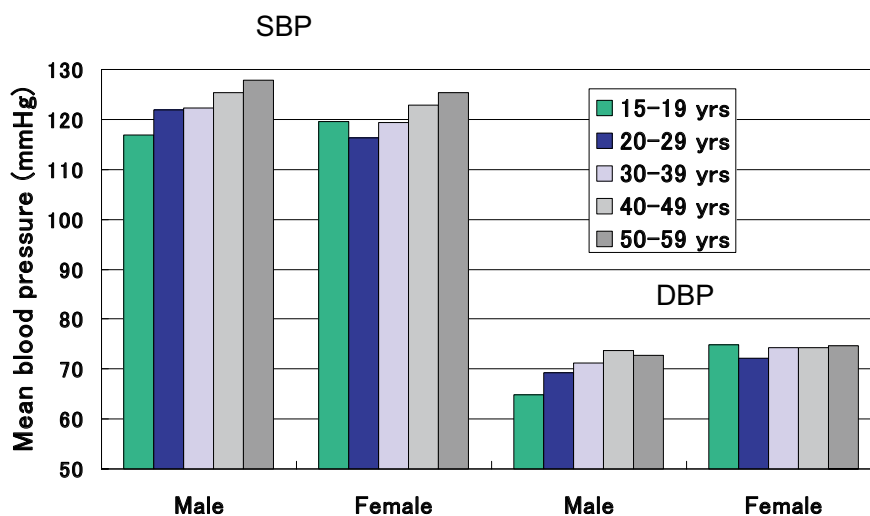


Fig. 4 Systolic and diastolic blood pressure by age group and sex

upper arm circumference ( $p>0.05$ ).

**2. Blood pressure:** Systolic blood pressure of both sexes and diastolic blood pressure of males increased with ageing ( $p<0.001$ ; Fig. 4). Fig. 5 displays proportion of categorized blood pressure; i.e., optimal, normal, normotension and hypertension. In both males and females, proportion of normotension/hypertension had a tendency to increase in advanced age.

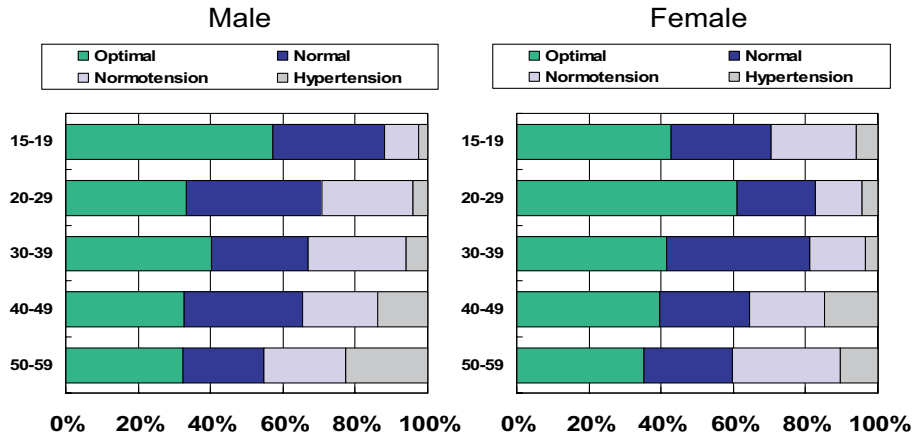


Fig. 5 Blood pressure category by age group and sex

Systolic and diastolic blood pressure was multiply regressed with all the dependent variables obtained in the health examination (except for those by urinary dipstick test). After stepwise selection of the dependent variables, significant multiple regressions of systolic and diastolic blood pressure were obtained as follows: systolic blood pressure =  $0.66 \times (\text{body weight}) - 0.74 \times (\text{upper arm circumference}) + 0.25 \times (\text{pulse rate}) + 0.26 \times (\text{age}) + 74.3$  ( $R^2=0.25, p<0.001$ ), and diastolic blood pressure =  $1.01 \times (\text{BMI}) - 0.46 \times (\text{upper arm circumference}) + 0.23 \times (\text{pulse rate}) + 0.12 \times (\text{age}) + 37.5$  ( $R^2=0.25, p<0.001$ )

**3. Blood glucose:** Blood glucose of males and females tended to increase with ageing, the generation difference was significant only in females ( $p<0.001$ ; Fig. 6).

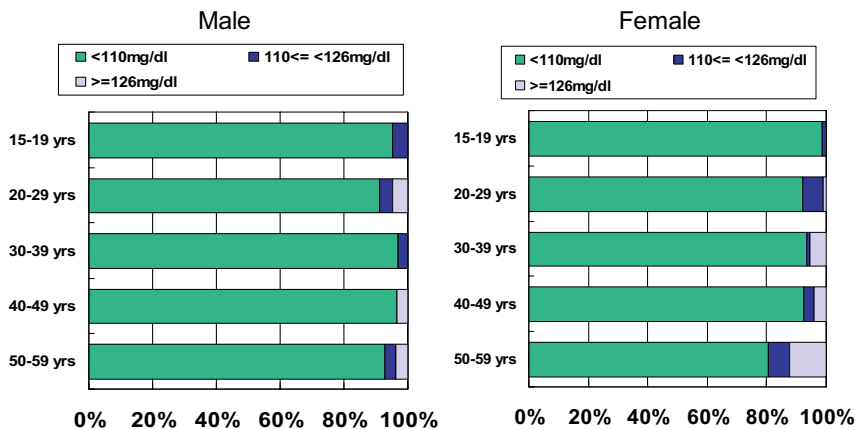


Fig. 6 Fasting blood glucose by age group and sex

The relationship between obesity (normal, overweight and obese, categorized by BMI) and DM type (normal, Impaired glucose tolerance; IGT and DM) was examined by sex. In males, the relationship was significant ( $\chi^2 = 14.0, p < 0.05$ ), i.e. the more the obese proportion, the more the DM proportion, however, the relationship was not significant in females. Males elder group showed good correlation, but it did not reach significant level due to small number of subjects.

**4. Urinary dipstick test:** Urinary excretion of protein (Fig. 7) and blood (Fig. 8), indicator of kidney function and used for screening of kidney related diseases, and that of leukocyte (Fig. 9), marker of recent infections, were examined. Proportion of urinary protein or blood “positives”, those who excreted protein or blood in the urine, increased with ageing. While that of urinary leukocyte “positives” was rather constant throughout the age group and generally higher in females than in males.

Finally, accumulate logistic regression analysis was conducted to discriminate DM type (dependent variable) with all other measurements (including results of urinary dipstick test) as independent variables, however, significant regression was not obtained partly because few (26) DM cases for 672 subjects.

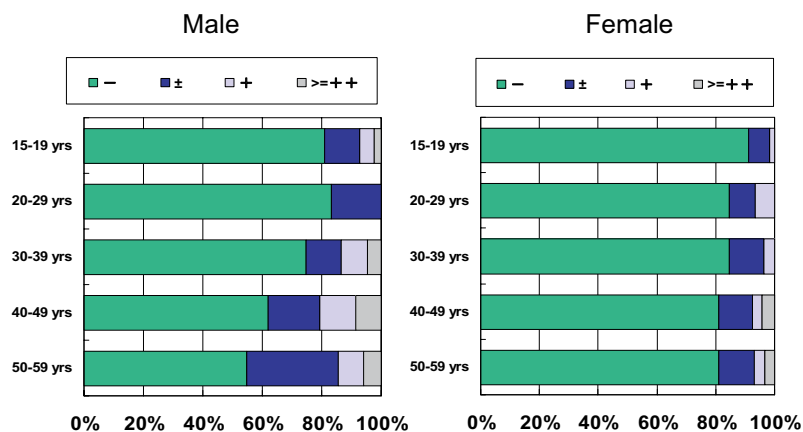


Fig. 7 Urinary protein distribution by age group and sex

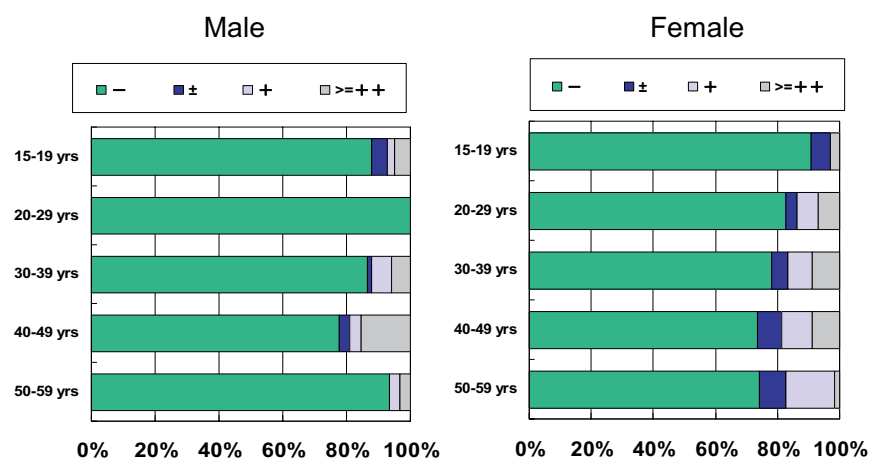


Fig. 8 Urinary blood distribution by age group and sex (subject having her period was excluded)

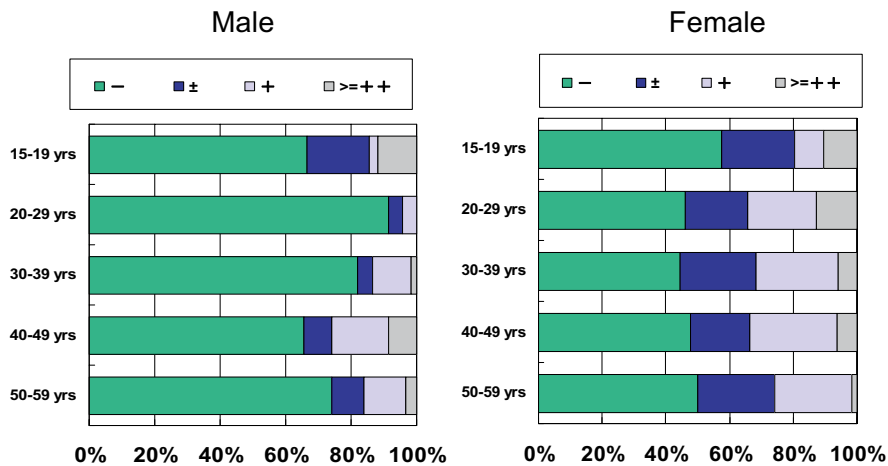


Fig. 9 Urinary leukocyte distribution by age group and sex (subject having her period was excluded)

#### Discussion Points and Concluding Remarks

1. For anthropometry, generation difference was detected in females body height and body weight of both sexes. It is worth considering recent secular trend with collecting more information about changes of food and nutrition in the research area.
  2. Both systolic and diastolic blood pressures increased with ageing as were found in many (even rural) parts of the developing countries. And they were significantly regressed with body weight and fatness (diastolic blood pressure only). Current good nutrition, which is suggested by BMI trend, should potentially contribute to this phenomenon.
  3. DM cases are outstanding in elder females. Another group who investigated elderly people (after 60s) detected high (about 20%) prevalence of DM not only in our research area but also in other parts of Lao PDR, so that fifties may be a critical age to get this sick. As was shown in the result section, human characteristic/functional factors obtained in our study did not contribute to DM type, and thus further studies are needed to identify critical attributable factors in the local settings.
  4. Results from urinary dipstick test indicated that there should be potential kidney infection in the research area. Other information source suggested that generally hard water in Lao PDR causes kidney stone. It is necessary to adopt further clinical methodology, e.g., ultrasonic diagnosis, to confirm this in Lao PDR.
- It was concluded that both infectious and chronic diseases exist in adult people in Lahanam area. In order to disclose their attributes, it is needed to examine more critical factors such as food habits, activities, environmental conditions and drug use, which were not treated in this paper.

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## References

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要旨：2005年9月にラオス・サバナケット県ソンコーン郡ラハナム地区（6村落）のうちベンカムライ村を除く5村落の成人（15歳～59歳）を対象として、身体計測（身長・体重・上腕囲・皮脂厚）・最大/最小血圧・空腹時血糖・試験紙を用いた半定量的尿試験、を行った。ランダムサンプリングを目指したが、実際には30代・40代のしかも男性より女性の参加が多く（男222人、女450人、合計672人）、参加率は男性対象者の約20%、女性対象者の約30%であった。その結果、1）身体計測値に年代間差が見られ、近年の栄養状態の改善が示唆された。2）過体重と肥満者割合は男性より女性で高く、加齢と共に上昇していた。3）高血圧者割合は男女とも年齢と共に高くなり、身体計測値を独立変数とした重回帰式では最大/最小血圧とも25%説明でき、体重やBMI・年齢・脈拍は正に、上腕囲は負に寄与していた。4）空腹時血糖値から判断した糖尿病患者割合は男性より女性で高い傾向にあり、50歳代では20%に達していた。5）尿検査からは潜在的な腎機能障害（腎臓結石）や感染症の高さが伺えた。以上の全ての検査項目を独立変数とし、糖尿病のレベルを従属変数として累積ロジスティック回帰分析を行ったが、糖尿病患者が少なかったためもあり糖尿病のレベルを判別できる回帰式は得られなかった。以上のことから、ラハナム地域の成人男女に慢性病と感染症が共に存在することが示唆されたが、これらの成因を明らかにするには本報告で扱わなかった食生活や活動、環境条件や薬物使用などの重要な要因を検討する必要がある。