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学位論文名	モンゴルにおける一般住民を対象とした慢性疾患をエンドポイントとするコホート研究
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## 論文内容の要旨

### 1 研究目的

Non-communicable diseases (NCDs) and its complications are crucial public health problems in Mongolia. For more than a decade, cardiovascular diseases (CVDs) are the leading cause of death and fourth leading cause of morbidity in Mongolia, and cancer is the second leading cause of mortality in Mongolia. Consequently, the high prevalence of NCD causing deaths has had an impact on life expectancy of Mongolians. Life expectancy is lower than developed countries, which ranked 153rd out of 223 countries in worldwide in the year of 2009. Many Mongolian people suffer from non-communicable chronic diseases. In order to determine a prevalence of common modifiable risk factors for NCDs, the STEPs surveys and diabetes surveys were done in Mongolia. However, the nationwide population-based cohort study has not been conducted yet in Mongolia while descriptive and cross-sectional study designs were commonly used and there have been very limited data on risk factors for NCDs related on demographic and geographical characteristics of Mongolians. In order to plan preventive strategies against such chronic diseases, we designed a community-based prospective cohort study of chronic diseases, the Moncohort study, in Mongolia.

The goal of the study was to obtain a better understanding of how diet, physical activity, body size, lifestyle and cultural factors relate to the development and progression of diseases.

1. To determine the incidence and prevalence of NCDs in Mongolian people  
According to this aim, we conducted a cross-sectional study in Mongolian people aged 40 years and over.

2. To determine the etiology and risk factors of NCDs in Mongolian people

In accordance with aim 2, we will conduct prospective cohort study in Mongolian elder people

3. To determine the risk factors association of NCDs in Mongolian people

Following the aim 3, we will determine the risk factors association of NCDs using statistical analysis.

## 2 研究方法

The study was consisted of two steps. In the first step, we conducted population-based cross-sectional survey using stratified multistage, probability, random cluster sampling from people aged 40 years and over. A prepared standard questionnaire had been used, in pursuance of WHO STEPS Surveillance Manual, which included socioeconomic status, alcohol and tobacco use, nutrition, physical activity, genetic anamnesis and health status of participants. The questionnaire was obtained by interview.

The questionnaire consisted of 8 chapters with total of 80 close ended and open ended questions. Medical tests included seated blood pressure, height, weight, waist and hip circumference measurements, and serum lipids and fasting glucose levels.

The prospective cohort study design will be conducted with follow up study. Participants will be followed up until death. The incidence of morbidity and mortality of NCDs (CVDs, diabetes and cancer) will be monitored.

## 3 研究成果

A total of 2280 participants were enrolled in the survey (mean age  $52.9 \pm 9.2$  years). Twenty four percent of the study participants had tobacco use (50.5% in men and 8.3% in women) and 60.3% of participants (75.6% in men and 35.2% in women) drank alcohol during previous 12 months. Unhealthy nutrition dominantly in participants and 8.3% of them never used vegetables and 29.8% of them never used fruits. Thirty seven percent of study participants have overweight, 26.6% of them have obesity, 63.6% of them central obesity, and obesity was higher in women than men. The prevalence of diabetes was 8.0%, hyperglycemia was 7.4% and hypertension was 63.8% in study participants. Metabolic syndrome (MetS) was 40.9% in Mongolian adults. MetS prevalence was different by sex, region and marital status in Mongolian. We determine the risk factor association of CVDs (hypertension, ischemic heart disease (IHD), Metabolic Syndrome (MetS)).

Univariate analyses showed that smoking habits (former and current smokers) (odds ratio [OR] =2.16; 95% confidential interval [CI]: 1.39-3.36 and OR=2.01; 95% CI: 1.09-3.69) and non-frequent intake of fruits (OR=1.66; 95% CI: 1.14-2.40) and vegetables (OR=1.99; 95% CI: 0.57-1.64), were significantly positively associated with IHD in men. These results were attenuated in a multivariate regression analysis, and only current and ex smoking habits (AOR=2.15; 95% CI: 1.37-3.40 and AOR=1.84; 95% CI: 0.98-3.44) remained as significant risk factors for IHD in men. In multiple logistic regression models, increasing age (OR=2.10; 95% CI: 1.22-3.62), heavy rather than low moderate alcohol drinking habits (OR=0.66; 95% CI: 0.44-.099) and lower levels of higher education (OR=0.50; 95% CI: 0.26-0.97) were significantly associated with IHD in women.

Univariate analyses showed that smoking habits (current smokers) (OR =0.72; 95% CI: 0.54-0.98) and higher education level (OR=0.56; 95%CI: 0.31-1.00) were inversely and obesity (OR=1.79; 95% CI: 1.25-2.56) was significantly positively associated with HTN (HTN) in men. These results were attenuated in a multivariate regression analysis, and current smoking habits (adjusted OR=2.13; 95% CI: 1.37-3.40) and obesity adjusted (OR=1.79; 95% CI: 1.23-2.61) remained as significant risk factors for HTN in men. In multiple logistic regression models, ageing (OR=3.27; 95% CI: 2.17-4.92), diabetes (OR=1.65; 95% CI: 1.03-2.64) and obesity (OR=2.01; 95% CI: 1.48-2.73) were significantly associated with HTN in women.

A moderate-to-high alcohol consumption was a significantly positively associated factor of MetS in men (OR =2.01; 95% CI: 1.15-3.51). This significant association remained after adjustment in multivariate analysis (AOR =2.41; 95% CI: 1.31-4.44). In multiple logistic regression models, widowed status was significantly associated with MetS in women (OR=1.61, 95% CI: 1.18-2.18; AOR=1.49, 95% CI: 1.07-2.08).

#### 4 考察

The current paper described the outline at baseline of the Moncohort Study, the first nationwide large-scale community-based cohort study for chronic diseases conducted in Mongolia. The study includes a general cohort of people living in rural and urban regions of Mongolia.

Geographically, there were significant differences in several factors, such as smoking habits, alcohol drinking, unhealthy diet, anthropometric measurements and medical histories, among the regions. A different infrastructure of Mongolia (i.e., SES, food transportation and health services) may partly cause the regional differences. Indeed, a previous study showed a regional difference in meat and alcohol consumption within Mongolia (e.g., heavy drinkers more prevalent in Khangai region than other regions, observed in the current study). Whether the difference among regions and location influences the endpoints of this study would be proven in future analysis.

In this context, the current study seems to be representative to the national trends of the demographic, lifestyle, and anthropometric and biochemical characteristics of Mongolian people. Therefore, the Moncohort study will provide important new information about the risk factors and prevention of chronic diseases in Mongolian adults. The geographical diversity of the cohort is the strength of the study, which may provide significant insights about interactions among geographical diversity, risk factors and chronic diseases. The study results would be applicable to public health action and promote new approaches to prevent the progression of chronic diseases. Several major risk factors of NCDs, including CVDs, cancer and diabetes, will be explored.

##### Study strengths

1. This study includes representative random sample of Mongolian elder people.

2. This study is expected to establish future cohort study of NCDs in Mongolia
3. This study result can be compared other international study results (we using international standard methods for questionnaire, laboratory analyze, body measurements)

While the study was large, there were limitations to the study. The baseline survey based on the cross-sectional study design that limited to discuss the causality of the results. The self-report of previous history of diseases such as hypertension and diabetes mellitus might result in diagnostic or recall bias. These can lead to a careful interpretation of the study. Estimation of the non-response rate from randomly selected household members was not accurate due to the limitation of time spent for data collection, the sparsely located population, and the lack of transport facilities particularly in rural areas which led to a potential bias towards selecting locations closer to hospitals/health centers in the data collection process.

Diagnosis of diabetes: We did not determine glycated hemoglobin (HbA1c) and 2 hour glucose (glucose tolerance test).

## 5 結論

In conclusion, NCDs were prevalent, especially among people aged over 40 years, in Mongolia. In Mongolia, Moncohort study will provide important new information about the risk factors of NCDs development among Mongolian adults and its role in preventing NCDs. It is hoped that the study's result will be applicable to public health action and promotion and through the suggestion of new approaches to prevent progression of NCDs.

## 論文審査の結果の要旨

申請者から約30分間の学位論文のプレゼンテーションがなされて、各審査委員から質問が出され、それぞれの回答を基に討論がされた。

各委員からの質問事項

1. モンゴルを4つのareaにわけているがそれぞれの地域間でethnicityの差はないのか。
2. なぜWomen widowedではMetSのリスクが高く、single or divorcedでは低いのか
3. 野菜や果物消費の少ない人でなぜIHDの頻度がより大きいのか
4. 本論文ではIGTでなくてIFGの検討をしているので修正すべきである。
5. Incidenceは、prevalenceの間違いではないか？
6. モンゴルでは平均寿命が日本と比べて約15年程低いようである。これほどの差を生む背景として、健康保険の利用や健康維持への政府援助といった要素は関係していないであろうか？もしそうだとすると、このような要因も考慮に入れた上で、今回の研究データに基づいて、モンゴルにおける今後の健康政策を立てるとすれば、どのようなことが疾患発症

を予防する上で重要と考えるか？意見を聞かせてほしい。

上記の質問については口頭で学位申請者から回答がされ、いずれも満足すべき内容であった。

その他：本論文には多くの文法的、表現的、文章的改善点が指摘された。それらの修正されるべき個所がまだ残っており、その修正が満足される程度に実施されてから本論文を学位論文として適当であると判断することとなり、申請者に審査委員からの指摘事項の修正後、検討した結果、修正は適当であると判断され、学位論文として受理することとした。

## 最終試験の結果の要旨

本論文はモンゴルにおける地域性と non-communicable disease（生活習慣病、MetS, Hypertension, Diabetes, Ischemic heart disease）との関連性を統計学的に検討している。独立因子として、肥満度、アルコール消費、タバコ習慣、年齢、socio-education state, 婚姻状況、職種、野菜・果物摂取状況、身体活動量を用いて、生活習慣病の罹患率との関連で単変量・多変量解析を用いて検討している。また、2009年以降縦断的にフォローアップしたコホート研究を行い死亡率との関連性についても解析している。

研究は2304名の調査で実施され、2280名で解析された。本研究は今後のモンゴルにおける健康推進対策に重要な知見を与える基礎資料として重要である。これらの結果はモンゴルにおける地理的、統計的データを基に生活習慣病発生頻度対策に影響を与えるものであり、更なるリスク因子検索調査が必要であることを示している。

論文の修正箇所は満足する内容であることを委員の持ち回り審査で確認したため、学位論文としては合格と判断することとなった。

以上の結果から委員全員一致で本学位論文審査を合格と審査した。