

# Prevalence and Factors Associated with Abnormal Cervical Cell among the Hmong and Mien Hill Tribe Women in Pha Yao Province, Thailand

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## ABSTRACT

**Objective:** To estimate the prevalence and to determine factor associated with abnormal cervical cell among the Hmong and Mien hill tribe women.

**Methods:** A cross-sectional study aimed to estimate the prevalence and to determine the factors associated with abnormal cervical cell among the Hmong and Mien hill tribe women living in Pha Yao province, Thailand was conducted. The data from validated questionnaires and Papanicolaou (Pap) smear test results were collected. Logistic regression was used to detect the associations between variables and abnormal cervical cell at the significant level of  $\alpha = 0.05$ .

**Results:** Totally, 450 Hmong and Mien women were recruited into the analysis. The overall prevalence of abnormal cervical cell was 2.2%; 1.2% were atypical squamous cells of undetermined significance (ASC-US), 0.4% were atypical squamous cells-cannot exclude HSIL (ASC-H), 0.4% were cervical intraepithelium neoplasia-I (CIN-I) and 0.2% were cervical intraepithelium neoplasia-II (CIN-II). Two variables, the number of their sexual partners and the number of husbands' sexual partners, were significantly associated with abnormal cervical cell. The women who had  $\geq 4$  sexual partners had a 7.09 times (95%CI=1.85-27.17) more likely to have abnormal cervical cell than those who had  $< 4$  sexual partners. The women whose husbands had  $\geq 4$  partners had a 5.63 times (95%CI=1.51-20.90) more likely to have abnormal cervical cell than those whose husbands had  $< 4$  sexual partners.

**Conclusion:** The number of sexual partners is significantly associated with abnormal cervical cell among the Hmong and Mien hill tribe women. Health interventions regarding safe sex should be promoted in the hill tribe people.

**Keywords:** Abnormal cervical cell; Hmong; Mien; hill tribe; prevalence (Siriraj Med J 2019;71: 220-227)

## INTRODUCTION

Cancer is a major threat to human life in worldwide. In 2015, there were 17.5 million cases worldwide and 8.7 million deaths.<sup>1</sup> This number is expected to increase to 24 million by 2035.<sup>2</sup> Cervical cancer is the significant leading cause of death globally in women including Thailand.<sup>3</sup> The human papillomavirus (HPV) is the cause of cervical cancer which involved sexual behavior.<sup>4-6</sup>

Consequently, personal suffering and economic loss are the major impacts to an individual health and family.

In 2016, the Ministry of Public Health reported that cervical cancer was ranked the second overall cause of death in women in Thailand with the prevalence at 608/100,000 population.<sup>7</sup> The northern region of Thailand reported the highest prevalence and accounted for 12.1% of all female cancer. The average age-standardized incidence

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rate (ASR) was 17.0 per 100,000.<sup>8</sup> In 2016, Pha Yao province was ranked second followed by Chiang Rai province with the ASR at 25.0/100,000 pop which was higher than the average ASR of northern Thailand.<sup>9</sup> Besides, the trend of cervical cancer is rising yearly, and it has become a significant health problem in Pha Yao province.<sup>10</sup> However, only 55.9% of women aged 30-60 were screened for cervical cancer by a Pap smear test, and less than 20.0% among the hill tribe women in 2015.<sup>11</sup>

A number of the hill tribe people live in Pha Yao province which is located in northern Thailand. Most hill tribe people living in Pha Yao province are Hmong and Mien.<sup>12</sup> These two tribes have their own culture, and lifestyles including sexual behaviors.<sup>13</sup> Most Hmong and Mien men and women have their first sexual intercourse at young age, and get married at early age as well.<sup>14</sup> Moreover, these tribes have a unique culture of polygamy.<sup>15</sup> Regarding their economic status, they are living under the poverty line of Thailand.<sup>16</sup> Hmong and Mien women did not favor a regular Pap smear test.<sup>17</sup> Therefore, a few data are available on cervical cancer among the hill tribe population particularly the Hmong and Mien women. This study aimed to assess the prevalence and to determine the factors associated with cervical cancer among the Hmong and Mien women. The data could be used to develop public health policy and also health promotion intervention in the area.

## MATERIALS AND METHODS

### Study design

A cross sectional study was used to assess the prevalence and to determine the factors associated with abnormal cervical cell among the Hmong and Mien women.

### Study setting

The study was conducted in 13 Hmong and Mien villages in Pong, and Chiang Kham districts, Pha Yao province. Seven villages were selected from Pong district; Ban Pang Kha, Ban Pang Ma-O, Ban Sip Song Pattana, Ban Kun Kam Lang, Ban San Ti Suk, Ban Saeng Sai, and Ban Hwayy Khok Moo villages. Another 6 villages were selected from Chiang Kham district; Ban Mai Rom Yen, Ban Pra Cha Pak Dee, Ban Hwayy Poom, Ban Pra Cha Pattana, Ban Rong San, and Ban Hwayy Diar Doi Nang villages.

### Study population

Hmong and Mien women aged 30-60 years old and their husbands who lived in the study settings were the study population.

### Inclusion criteria

a) Those that self-identified as Hmong or Mien tribe women, b) aged between 30 and 60 years old, c) married, d) lived in the study area for at least 1 year.

### Exclusion criteria

a) Those that could not provide essential information due to any causes such as ability to communicate in Thai, b) women who had a period at the date of Pap smear test, c) women who were pregnant.

### Study sample and sample size calculation

Hmong and Mien women aged 30-60 and their husbands were the target population. In 2016, there were 2,038 couples living in the 13 villages.<sup>8</sup> The sample size was calculated by the following formula<sup>19</sup>;

$$n=(Z^2 P(1-P))/d^2$$

At the confidence level 95%,  $d = 0.05$ ,  $P = 12.2\%$ <sup>14</sup>, at least 405 samples were required. Adding for any errors during the study for 10.0%, then, 450 samples were needed for the analysis.

### Research instruments

A validated questionnaire and Pap smear test were used for data collection in the study. There were 5 parts in the questionnaire. Part I asking about the general information which consisted of five questions; age, tribe, education, religion, income, etc. Part II consisted of six questions regarding the risk factors such as what age they got married, number of partners, history of sexually transmitted infections (STIs), history of Pap screening test previous year, etc. Part III consisted of four questions, asking about risk behaviors of husband such as number of partners, history of STIs, etc. Part IV consisted of six questions regarding health behaviors such as smoking, alcohol drinking, etc. Part V consisted of thirty short questions regarding knowledge, attitude, and practice for cervical cancer prevention.

Questionnaire was developed from the literature review and consulting with experts in relevant fields. Questionnaire was tested for validity by Index of Item Congruence (IOC) method which was assessed by three external experts. Questions that resulted in IOC score of less than 0.5 were excluded. After that, a pilot test was done with 30 participants with similar characteristics with the study sample. The purposes of the pilot test were to determine the reliability, feasibility, and possibility of collecting the data from the participants. Questions in part V were tested for reliability from the pilot test using Cronbach's alpha. Questions that had Cronbach's alpha less than 0.5 were deleted due to less reliability.

Resulting, the overall Cronbach's alpha was 0.76. Moreover, Kuder-Richardson (KR)<sup>20</sup> was used to detect the quality of questions regarding the knowledge. The overall KR score was 0.71.

Pap smear (The Bethesda 2001 Cytology Report) was used to collect the specimen. The process of collecting the specimen was done by two trained nurses. All specimens were sent to Chiang Kham, which has the only standard institute with medical laboratory in Pha Yao province for detection the cervical cancer. Abnormal cervical cell was defined according to the Bethesda system 2001 as; atypical squamous cells of undetermined significance (ASC-US), atypical squamous cells cannot exclude high grade squamous intraepithelial lesion (ASC-H), low grade squamous intraepithelial lesion (LSIL) encompassing human papillomavirus change/cervical intraepithelial neoplasia I (CIN I), high grade squamous intraepithelial lesion (HSIL) encompassing cervical intraepithelial neoplasia II (CIN II)/cervical intraepithelial neoplasia III (CIN III)/with feature suspicious for invasive, squamous cell carcinoma, atypical glandular cell, atypical glandular cells favor neoplasia, endocervical adenocarcinoma in situ, adenocarcinoma endocervical cells/endometrials, other malignants.

#### **Data collection procedures**

After getting the ethical approval from the Human Research Committee from Mae Fah Luang University, Pha Yao Public Health Office was contacted to request their approval to conduct the study and also information regarding the hill tribe villages in Pha Yao province including the contact number of all health promoting hospitals in the study area. Four health promoting hospitals located at the hill tribe villages were contacted; Pang Kha, Khun Kwaun, Hway Khok Mhoo and Rom Yen health promoting hospitals. Two trained nurses on Pap smear technique were contacted for to help in collecting specimen. A one-day training course was provided for two trained nurses and all health promoting hospitals staff regarding research objectives and procedures.

All targeted village leaders were contacted and asked for their cooperation to conduct the study. Lists of women who met the inclusion criteria were sent to the researcher who was supported by the village headman. A simple random sampling was used to select the study samples. Appointments were made with all the selected samples at the health promoting hospitals close to their resident.

On the day of collecting data, all the participants and their husbands were provided the essential information and the researcher obtained the informed consent form

from both of them before interview. The interviews were done separately in a private and confidential room. Each interview lasted for 20 minutes for woman, and 10 minutes for husband. After the interview, a trained nurse collected specimen from the women.

#### **Statistical analysis**

Data were coded and double-entered into Microsoft Excel 2010. The analysis was conducted by using SPSS (version 20; IBM, Armonk, NY). Descriptive statistics was used to explain the characteristics of the participants; percentage, mean, SD. Logistic regression was used to detect the associations between variables and abnormal cervical cell as an outcome at the significant level  $\alpha=0.05$ . All independent variables were detected the association with the outcome in simple logistic regression model. Afterward, all significant variables in simple logistic regression model were considered to put into the multivariate analysis by using "ENTER" mode. Variables remaining a significant association with the outcome, were determined as factors association with abnormal cervical cell in the final model.

#### **Ethical considerations**

The study was approved by the Ethics Committee for Human Research, Mae Fah Luang University, Chiang Rai, Thailand (No.REH-60022). All information was kept in the private and secured code only the researcher could access. After the analysis was complete, data were deleted including the questionnaire and laboratory results. A small gift was given to all participants to appreciate their cooperation. The laboratory results were sent to all participants with the guideline for future medical care required particularly those who were abnormal.

## **RESULTS**

#### **Characteristics of women**

A total of 450 women were recruited into the analysis. More than half were Hmong (63.6%), average age was 45 (SD=8), and majority were aged 51-60 years (36.2%). Most participants graduated primary school (50.0%), worked as farmers (77.3%), and had monthly income  $\leq 3,000$  Bath (55.3%). Most participants had free access to health care. More than half had their first sexual intercourse while aged  $< 18$  years (53.8%), and married while aged  $< 18$  years (52.4%). Almost all the participants had  $< 4$  sexual partners (90.0%), and only 17.5% were screened for cervical cancer previous year. A few of the participants had congenital problem; 13.3% had yellow or green or offensive odour leucorrhoea, and 8.9% had a history of genital ulcer. Regarding health behaviors;

44.0% smoked, and 37.3% drank alcohol. Regarding the knowledge, attitude, and practice on cervical cancer prevention; 46.4% had low level of knowledge, 28.0% had negative, neutral or positive attitude towards cervical cancer prevention, and 26.4% had incorrect practice of cervical cancer prevention, respectively (Table 1).

### Characteristics of husband

Majority had < 4 partners (76.9%), none of them had a genital discharge. A few of them had a history of genital ulcer (3.3%), and some of them had experience of having sexual intercourse with sex workers (11.6%) (Table 2).

The overall prevalence of abnormal cervical cell was 2.2%; 1.2% were atypical squamous cells of undetermined significance (ASC-US), 0.4% were atypical squamous cells and cannot exclude high grade squamous intraepithelial lesion (ASC-H), 0.4% were low grade squamous intraepithelial lesion (LSIL) encompassing cervical intraepithelial neoplasia I (CIN I), and 0.2% were high grade squamous intraepithelial lesion (HSIL) encompassing cervical intraepithelial neoplasia II (CIN II) (Table 3). There were 7 participants positive among 286 Hmong women (2.5%), and 3 positive participants among 164 Mien women (1.8%). There was no statistically significant difference between tribes ( $\chi^2=0.17$ , p-value=0.675).

Three variables were significantly associated with abnormal cervical cell in the univariate analysis: women's number of partners, husband's number of sexual partners, and husband's history of sexual intercourse with sex workers (Table 1).

In the multivariate model, two variables were still significantly associated with abnormal cervical cell; women's number of partners, and husband's number sexual partners. Women who had  $\geq 4$  partners had a 7.09 time (95%CI=1.85-27.17) more likely to have abnormal cervical cell than those who had < 4 partners. Women whose husbands had  $\geq 4$  partners had a 5.63 time (95%CI=1.51-20.90) more likely to have abnormal cervical cell than those whose husbands had < 4 partners (Table 1).

## DISCUSSION

The study found that Hmong and Mien in Pha Yao province are living in low socio-economic condition. The overall prevalence of abnormal cervical cell among our study subjects was 2.2%. Number of partners both in women and men are the factors associated with cervical cancer in the Hmong and Mien women in Pha Yao province. In our study, it was found that the prevalence of cervical cancer between Hmong and Mien women

was not statistically different. However, a study in Iran<sup>21</sup> reported some ethnicity related trends in cervical cancer. The study of Akram Husain<sup>22</sup> also reported that some groups of Indian women in the south were at a greater risk of cervical cancer than women who lived in other regions in India. In terms of the prevalence of cervical cancer among these two hill tribe women is higher than Thai national rate at 23/100,000 population.<sup>23</sup> The rate of screening for cervical cancer is also lower than Thai targeted women at 60.2%.<sup>23</sup>

In our study we found that women's number of partners was a significant factor associated with abnormal cervical cancer. Liu, et al<sup>24</sup> reported that number of partners was highly associated with cervical cancer from the meta-analysis. Whereas several studies<sup>25-27</sup> reported that women's number of partners and history of STIs were associated with cervical cancer among the women in South Africa. However, the study of Obiri-Yeboah<sup>28</sup> reported that age of women and circumcision status of main sexual partner were associated with cervical cancer, but no association was found with number of partners.

We also found that number of partner of husband related to the occurrence of cervical cancer in women. This coincides with the study which was conducted in Shanxi province, China reported that number of partners of women and her husband were associated with cervical cancer of women.<sup>29</sup>

Some limitations were found in the study. First, at the beginning of the interview process, both male and female participants were interviewed by a female interviewer. However, upon completing 3 interviews; it was found that the husbands were not comfortable to provide information. Afterwards, the process was adjusted and interviews were conducted by same sex. Another point is the ability to communicate in Thai. It was found that 3 women were excluded from the study due to limitation in use of Thai. They could not provide the essential information to the interviewer. The study could not use a translator for gathering information from the participants since all information required are sensitive. Moreover, 7 selected women were excluded from the study because 5 were on their period, and 2 were pregnant. However, the researcher believes that it did not impact the study results since an excess of 20 couples had been selected at the stage of sample selection by a random method.

## CONCLUSION

The hill tribe women are at risk for abnormal cervical cell. The number of partners of both women and the number of partners of their husband are identified as the

**TABLE 1.** Univariate and multivariate analyses of factors associated with abnormal cervical cell.

| Characteristics  | Total<br>n (%) | Abnormal<br>n (%) | Normal<br>n (%) | OR   | 95% CI       | P-value | OR <sub>adj</sub> | 95% CI       | P-value |
|--|----------------|-------------------|-----------------|------|--------------|---------|-------------------|--------------|---------|
| <b>Tribe</b>   |                |                   |                 |      |              |         |                   |              |         |
| Hmong  | 286 (63.6)     | 7 (2.4)           | 279 (97.6)      | 1.34 | (0.34-5.28)  | 0.670   |                   |              |         |
| Mien   | 164 (36.4)     | 3 (1.8)           | 161 (98.2)      | 1    |              |         |                   |              |         |
| <b>Age (years)</b>   |                |                   |                 |      |              |         |                   |              |         |
| 30-40  | 152 (33.8)     | 4 (2.6)           | 148 (97.4)      | 2.17 | (0.39-12.05) | 0.374   |                   |              |         |
| 41-50  | 135 (30.0)     | 4 (3.0)           | 131 (97.0)      | 2.45 | (0.44-13.63) | 0.303   |                   |              |         |
| 51-60  | 163 (36.2)     | 2 (1.2)           | 161 (98.8)      | 1    |              |         |                   |              |         |
| <b>Education</b>   |                |                   |                 |      |              |         |                   |              |         |
| Illiterate   | 151 (33.6)     | 4 (2.6)           | 147 (97.4)      | 0.98 | (0.17-5.47)  | 0.981   |                   |              |         |
| Primary school   | 225 (50.0)     | 4 (1.8)           | 221 (98.2)      | 0.65 | (0.11-3.63)  | 0.625   |                   |              |         |
| High school  | 74 (16.4)      | 2 (2.7)           | 72 (97.3)       | 1    |              |         |                   |              |         |
| <b>Occupation</b>  |                |                   |                 |      |              |         |                   |              |         |
| Farmer   | 348 (77.3)     | 6 (1.7)           | 342 (98.3)      | 0.39 | (0.07-2.01)  | 0.264   |                   |              |         |
| Merchant   | 55 (12.2)      | 2 (3.6)           | 53 (96.4)       | 0.84 | (0.11-6.27)  | 0.873   |                   |              |         |
| Labor  | 47 (10.5)      | 2 (4.3)           | 45 (95.7)       | 1    |              |         |                   |              |         |
| <b>Income (bath/month)</b>                                       |                |                   |                 |      |              |         |                   |              |         |
| ≤ 3,000  | 249 (55.3)     | 3 (1.2)           | 246 (98.8)      | 0.22 | (0.04-1.15)  | 0.075   |                   |              |         |
| 3,001-5,000  | 142 (31.6)     | 4 (2.8)           | 138 (97.2)      | 0.54 | (0.11-2.49)  | 0.431   |                   |              |         |
| ≥ 5001   | 59 (13.1)      | 3 (5.1)           | 56 (94.9)       | 1    |              |         |                   |              |         |
| <b>Religion</b>  |                |                   |                 |      |              |         |                   |              |         |
| Buddhist   | 401(89.1)      | 9 (2.2)           | 392 (97.8)      | 1.10 | (0.13-8.88)  | 0.927   |                   |              |         |
| Christian  | 49 (10.9)      | 1 (2.0)           | 48 (98.0)       | 1    |              |         |                   |              |         |
| <b>Rights of free access health care</b>                         |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 368 (81.8)     | 7 (1.9)           | 361 (98.1)      | 1    |              | 0.338   |                   |              |         |
| No   | 82 (18.2)      | 3 (3.7)           | 79 (96.3)       | 1.95 | (0.49-7.74)  |         |                   |              |         |
| <b>Age at first sexual intercourse (years)</b>                   |                |                   |                 |      |              |         |                   |              |         |
| <18  | 242 (53.8)     | 3 (1.2)           | 239 (98.8)      | 2.77 | (0.70-10.86) | 0.143   |                   |              |         |
| ≥18  | 208 (46.2)     | 7 (3.4)           | 201 (96.6)      | 1    |              |         |                   |              |         |
| <b>Age at marriage (years)</b>                                   |                |                   |                 |      |              |         |                   |              |         |
| <18  | 236 (52.4)     | 3 (1.3)           | 233 (98.7)      | 2.62 | (0.67-10.28) | 0.166   |                   |              |         |
| ≥18  | 214 (47.6)     | 7 (3.3)           | 207 (96.7)      | 1    |              |         |                   |              |         |
| <b>Number of partners (persons)</b>                              |                |                   |                 |      |              |         |                   |              |         |
| <4   | 405 (90.0)     | 6 (1.5)           | 399 (98.5)      | 1    |              |         | 1                 |              |         |
| ≥4   | 45 (10.0)      | 4 (8.9)           | 41 (91.1)       | 6.48 | (1.75-23.93) | 0.005*  | 7.09              | (1.85-27.17) | 0.004*  |
| <b>Method of contraception use</b>                               |                |                   |                 |      |              |         |                   |              |         |
| None   | 261 (58.0)     | 5 (1.9)           | 256 (98.1)      | 1    |              |         |                   |              |         |
| Orally   | 57 (12.7)      | 1 (1.8)           | 56 (98.2)       | 0.91 | (0.10-7.97)  | 0.935   |                   |              |         |
| Injection  | 58 (12.9)      | 3 (5.2)           | 55 (94.8)       | 2.79 | (0.64-12.03) | 0.168   |                   |              |         |
| Tubal ligation   | 74 (16.4)      | 1 (1.4)           | 73 (98.6)       | 0.70 | (0.08-6.09)  | 0.748   |                   |              |         |
| <b>History of yellow or green or offensive odour leucorrhoea</b> |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 62 (13.8)      | 3 (4.8)           | 59 (95.2)       | 2.76 | (0.69-11.00) | 0.148   |                   |              |         |
| No   | 388 (86.2)     | 7 (1.8)           | 381 (98.2)      | 1    |              |         |                   |              |         |



**TABLE 1.** Univariate and multivariate analyses of factors associated with abnormal cervical cell.

| Characteristics                                | Total<br>n (%) | Abnormal<br>n (%) | Normal<br>n (%) | OR   | 95% CI       | P-value | OR <sub>adj</sub> | 95% CI       | P-value |
|--|----------------|-------------------|-----------------|------|--------------|---------|-------------------|--------------|---------|
| History of genital ulcer                       |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 40 (8.9)       | 2 (5.0)           | 38 (95.0)       | 2.64 | (0.54-12.90) | 0.229   |                   |              |         |
| No   | 410 (91.1)     | 8 (2.0)           | 402 (98.0)      | 1    |              |         |                   |              |         |
| Smoking  |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 198 (44.0)     | 7 (3.5)           | 191 (96.5)      | 3.04 | (0.77-11.91) | 0.110   |                   |              |         |
| No   | 252 (56.0)     | 3 (1.2)           | 249 (98.8)      | 1    |              |         |                   |              |         |
| Alcohol use                                    |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 168 (37.3)     | 3 (1.8)           | 165 (98.2)      | 0.71 | (0.18-2.80)  | 0.629   |                   |              |         |
| No   | 282 (62.7)     | 7 (2.5)           | 275 (97.5)      | 1    |              |         |                   |              |         |
| History of cervical cancer of family member    |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 28 (6.2)       | 2 (7.1)           | 26 (92.9)       | 3.98 | (0.80-19.70) | 0.090   |                   |              |         |
| No   | 422 (93.8)     | 8 (1.9)           | 414 (98.1)      | 1    |              |         |                   |              |         |
| Exercise                                       |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 203 (45.1)     | 3 (1.5)           | 200 (98.5)      | 1    |              |         |                   |              |         |
| No   | 247 (54.9)     | 7 (2.8)           | 240 (97.2)      | 1.94 | (0.46-7.61)  | 0.340   |                   |              |         |
| Knowledge                                      |                |                   |                 |      |              |         |                   |              |         |
| Low  | 209 (46.4)     | 5 (2.4)           | 204 (97.6)      | 1.05 | (0.12-9.25)  | 0.962   |                   |              |         |
| Moderate                                       | 197 (43.8)     | 4 (2.0)           | 193 (98.0)      | 0.89 | (0.09-8.17)  | 0.919   |                   |              |         |
| High   | 44 (9.8)       | 1 (2.3)           | 43 (97.7)       | 1    |              |         |                   |              |         |
| Attitude                                       |                |                   |                 |      |              |         |                   |              |         |
| Low  | 126 (28.0)     | 4 (3.2)           | 122 (96.8)      | 2.78 | (0.30-25.37) | 0.363   |                   |              |         |
| Moderate                                       | 238 (52.9)     | 5 (2.1)           | 233 (97.9)      | 1.82 | (0.21-15.83) | 0.586   |                   |              |         |
| High   | 86 (19.1)      | 1 (1.2)           | 85 (98.8)       | 1    |              |         |                   |              |         |
| Practice                                       |                |                   |                 |      |              |         |                   |              |         |
| Low  | 119 (26.4)     | 2 (1.7)           | 117 (98.3)      | 0.82 | (0.11-5.93)  | 0.845   |                   |              |         |
| Moderate                                       | 233 (51.8)     | 6 (2.6)           | 227 (97.4)      | 1.26 | (0.25-6.39)  | 0.773   |                   |              |         |
| High   | 98 (21.8)      | 2 (2.0)           | 96 (98.0)       | 1    |              |         |                   |              |         |
| Number of sexual partners of husband (persons) |                |                   |                 |      |              |         |                   |              |         |
| <4   | 346 (76.9)     | 4 (1.2)           | 342 (98.8)      | 1    |              |         | 1                 |              |         |
| ≥4   | 104 (23.1)     | 6 (5.8)           | 98 (94.2)       | 5.23 | (1.44-18.92) | 0.012*  | 5.63              | (1.51-20.90) | 0.010*  |
| Condom use with other women (n=271)            |                |                   |                 |      |              |         |                   |              |         |
| Never  | 132 (48.7)     | 5 (3.8)           | 127 (96.2)      | 1.65 | (0.18-14.55) | 0.650   |                   |              |         |
| Sometimes                                      | 96 (35.4)      | 4 (4.2)           | 92 (95.8)       | 1.82 | (0.19-16.83) | 0.595   |                   |              |         |
| Always   | 43 (15.9)      | 1 (2.3)           | 42 (97.7)       | 1    |              |         |                   |              |         |
| Husband's history of genital ulcer             |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 15 (3.3)       | 1 (6.7)           | 14 (93.3)       | 3.38 | (0.40-28.54) | 0.263   |                   |              |         |
| No   | 435 (96.7)     | 9 (2.1)           | 426 (97.9)      | 1    |              |         |                   |              |         |
| History of sexual intercourse with sex workers |                |                   |                 |      |              |         |                   |              |         |
| Yes  | 52 (11.6)      | 4 (7.7)           | 48 (92.3)       | 5.44 | (1.48-19.98) | 0.011*  |                   |              |         |
| No   | 398 (88.4)     | 6 (1.5)           | 392 (98.5)      | 1    |              |         |                   |              |         |

\* Significant level at  $\alpha = 0.05$

**TABLE 2.** General characteristics of husbands.

| Characteristics                                      | n (%)       |
|--|-------------|
| Number of partners (persons)                         |             |
| <4   | 346 (76.9)  |
| ≥4   | 104 (23.1)  |
| Condom use while having sex with other women (n=271) |             |
| Never  | 132 (48.7)  |
| Sometimes  | 96 (35.4)   |
| Always   | 43 (15.9)   |
| History of genital discharge                         |             |
| Yes  | 0 (0.0)     |
| No   | 450 (100.0) |
| History of genital ulcer                             |             |
| Yes  | 15 (3.3)    |
| No   | 435 (96.7)  |
| Sexual intercourse with sex worker                   |             |
| Yes  | 52 (11.6)   |
| No   | 398 (88.4)  |

**TABLE 3.** Prevalence of abnormal cervical cancer.

| Characteristics  | N (%)             |
|--|-------------------|
| <b>Negative for intraepithelial lesion or malignancy (NIL)</b> | <b>345 (76.7)</b> |
| <b>Organism</b>  |                   |
| Trichomonas spp.   | 3 (0.7)           |
| Fungus   | 26 (5.8)          |
| Cocobacilli shift in vaginal flora                             | 32 (7.1)          |
| Others   | 2 (0.4)           |
| <b>Other non-neoplastic findings</b>                           |                   |
| Inflammation   | 29 (6.4)          |
| Atrophy  | 3 (0.7)           |
| <b>Epithelial cells abnormalities</b>                          |                   |
| <b>Squamous cells</b>  | <b>10 (2.2)</b>   |
| Atypical squamous cells of undetermined significance (ASC-US)  | 5 (1.2)           |
| Atypical squamous cells-cannot exclude HSIL (ASC-H)            | 2 (0.4)           |
| Low grade squamous intraepithelial lesion (LSIL)               |                   |
| Cervical Intraepithelium Neoplasia I (CIN-I)                   | 2 (0.4)           |
| High grade squamous intraepithelial lesion (HSIL)              |                   |
| Cervical Intraepithelium Neoplasia II (CIN-II)                 | 1 (0.2)           |

factors associated to abnormal cervical cell of Hmong and Mien women. Public health intervention which is focused on minimizing the number of partners among these hill tribe population should be implemented to reduce the possibility of having abnormal cervical cell.

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## REFERENCES

1. Fitzmaurice C, Allen C, Barber RM, Barregard L, Bhutta ZA, Brenner H, et al. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 32 cancer groups, 1990 to 2015: A systematic analysis for the global burden of disease study. *JAMA Oncology* 2017;3: 524-48.
2. World Cancer Research Fund International (WCRF International). Cancer facts & figures worldwide data. Available from <http://www.wcrf.org/int/cancer-facts-figures/worldwide-data>.
3. World Health Organization (WHO). Cancer situation in SEAR countries. Available from: <http://www.searo.who.int/thailand/news/cancer-sear/en/>
4. Sreedevi A, Javed R, Dinesh A. Epidemiology of cervical cancer with special focus on India. *Int J Women's Health* 2015;7:405-14.
5. Centers for Disease Control and Prevention (CDC). Gynecologic cancers: cervical cancer. Available from: <https://www.cdc.gov/cancer/cervical/>
6. World Health Organization (WHO). Cervical cancer prevention and control saves lives in the Republic of Korea. Available from: <http://www.who.int/news-room/feature-stories/detail/cervical-cancer-prevention-and-control-saves-lives-in-the-republic-of-korea>.
7. Sawatdimongkol S. Annual report of non-communicable diseases 2015. Available from: <http://www.thaincd.com/document/download/paper-manual/Annual-report-2015.pdf>
8. Lampang Cancer Hospital. Cancer incidence in northern Thailand, 2012-2016. Available from: [http://www.lpch.go.th/lpch/lpch\\_attachment/20151016085144134377.pdf](http://www.lpch.go.th/lpch/lpch_attachment/20151016085144134377.pdf)
9. Lampang Cancer Hospital. Cancer incidence in Pha Yao province. Available from: [http://www.lpch.go.th/lpch/lpch\\_attachment/20151202100952874252.pdf](http://www.lpch.go.th/lpch/lpch_attachment/20151202100952874252.pdf)
10. Thitibordin B. Reporting system of cancer service plan in Pha Yao province, Thailand. Available from: <http://bie.moph.go.th/eins59/upload/2559A12103114.doc>
11. Pha Yao Provincial Public Health Office, Thailand. Cervical cancer screening report. Available from: [http://203.209.96.247/chronic/rep\\_cancer\\_vagina.php](http://203.209.96.247/chronic/rep_cancer_vagina.php)
12. Hill Tribe Development Center of Pha Yao Province, Thailand. Hill tribe population data in 2016-2017. Available from: <http://www.sdc31.go.th/index.php?name=download&le=readdownload&id=19>
13. Apidechkul T. A 20-year retrospective cohort study of TB infection among the Hill-tribe HIV/AIDS populations, Thailand. *BMC Infect Dis* 2016;16:72.
14. Kritpetcharat OW, Sirijaichingkul S, Kritpetcharat P. Comparison of Pap smear screening results between Akha hill tribe and urban women in Chiang Rai province, Thailand. *Asian Pac J Cancer Prev* 2012;13:5501-4.
15. Thawongma S, Maneewan K. Roles of adolescents Hmong and sexual behavior modification. Hill Tribe's Health Development Center, Chiang Mai, Thailand. 2006.
16. Apidechkul T, Laingoen O, Suwannaporn S. Inequity in accessing health care service in Thailand in 2015: A case study of the Hill tribe people in Mae Fah Luang district, Chiang Rai, Thailand. *J Health Res* 2016;30 67-71.
17. Khirisuntikul S. Development of a health promotion model for cervical cancer prevention among hill tribe women aged 30-60 years. Available from: <https://www.nno.moph.go.th/research/index.php/2559/item/274-2559-1>
18. Pha Yao Provincial Public Health Office, Thailand. Hill tribe population in 2016. Pha Yao Provincial Public Health Office, Pha Yao, Thailand, 2016.
19. Naing L, Winn T, Rusli BN. Practical issues in calculating the sample size for prevalence studies. *Arch Orolfac Sci* 2006;1:9-14.
20. Mohaffyza MM, Sulaiman L, Sern LC, Salleh KM. Measuring the validity and reliability of research instruments. *Procedia Soc Behav Sci* 2015;204:164-71.
21. Michaan N, Gortzak-Uzan L, Grisario D, Laskov I. Ethnicity-related trends in gynecologic malignancies in Israel, 1993-2013. *Int J Gynaecol Obstet* 2018;142:176-81.
22. Akram Husain RS, Rajakeerthana R, Sreevalsan A, Prema Jayaprasad P, Ahmed S, Ramakrishnan V. Prevalence of human papilloma virus with risk of cervical cancer among south Indian women: A genotypic study with meta-analysis and molecular dynamics of HPV E6 oncoprotein. *Infect Genet Evol* 2018;62:130-40.
23. The HPV Information Center, Thailand. Human papilloma virus and related disease report. Available from: <http://www.hpvcentre.net/statistics/reports/THA.pdf>
24. Liu ZC, Liu WD, Liu YH, Ye XH, Chen SD. Multiple sexual partners as a potential independent risk factor for cervical cancer: a meta-analysis of epidemiological studies. *Asian Pac J Cancer Prev* 2015;16:3893-900.
25. Jolly PE, Mthethwa-Hleta S, Padilla LA, Pettis J, Winston S, Akinyemiju TF, et al. Screening, prevalence, and risk factors for cervical lesion among HIV positive and HIV negative women in Swaziland. *BMC Public Health* 2017;17:218.
26. Okunade KS, Nwogu CM, Oluwole AA, Anorlu RI. Prevalence and risk factors of genital high-risk human papillomavirus infection among women attending the out-patient clinics of a university teaching hospital in Lagos, Nigeria. *Pan Afr Med J* 2017; 28:227.
27. Mbulawa ZZA, van Schalkwyk C, Hu NC, Meiring TL, Barnabas S, Dabee S, et al. High human papillomavirus (HPV) prevalence in South Africa adolescents and young women encourages expanded HPV vaccination campaigns. *PLoS One* 2018;13(1): e0190166.
28. Obiri-Yeboah D, Akakpo PK, Mutocheluh M, Adje-Danso E, Allornuvor G, Amoako-Sakyi D, et al. Epidemiology of cervical human papillomavirus (HPV) infection and squamous intraepithelial lesion (SIL) among a cohort of HIV-infected and uninfected Ghanaian women. *BMC Cancer* 2017;17:688.
29. Shi N, Lu Q, Zhang J, Li L, Zhang J, Zhang F, et al. Analysis of risk factors for persistent infection of asymptomatic women with high-risk human papilloma virus. *Hum Vaccin Immunother* 2017;13:1404-11.