**2nd Day- Computer Exercise (Module 4)**

**–Natural history estimation**

1. **Dataset: WE3\_4049 & WE3\_5069**
2. **Variables in dataset:**
3. **tt**: time since last screening
4. **num**: case number of each situation
5. the first digit of **mode** variable:

1: prevalent screen-detected BC

2: subsequent screen-detected BC

3: interval cancer

8: negative

1. The second digit of mode variable:

1 or 2: round of screening

**DEMO**

**Example: three-state natural history of breast cancer for YOUNG WOMEN**

**Dataset: WE3\_40-49**

To explore the natural history of breast cancer for young women, please estimate the transition rates (λ1 and λ2) for 3-state Marko model based on the mammography screening data of Swedish Two-county Trial.

λ1 λ2

Normal 🡪 Preclinical breast cancer 🡪 Clinical breast cancer

1. What is the transition rate of λ1?

λ1=\_\_\_\_\_\_\_\_\_\_\_\_\_\_ , 95% CI: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the transition rate of λ2?

λ2=\_\_\_\_\_\_\_\_\_\_\_\_\_\_, 95% CI: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the mean sojourn time (MST) of preclinical breast cancer?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Exercise1: three-state natural history of breast cancer for Elder WOMEN**

**Dataset: WE3\_50-69**

1. What is the transition rate of λ1?

λ1=\_\_\_\_\_\_\_\_\_\_\_\_\_\_ , 95% CI: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the transition rate of λ2?

λ2=\_\_\_\_\_\_\_\_\_\_\_\_\_\_, 95% CI: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the mean sojourn time (MST) of preclinical breast cancer?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Please answer the question:**

1. Who possessed the higher incidence rate of breast cancer?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Who possessed the faster progression between preclinical and clinical state?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Likelihood function

WE3\_likelihood

value=**0**;

if mode[i]=**81** then value=p[**1**,**1**]/(p[**1**,**1**]+p[**1**,**2**]);

else if mode[i]=**11** then value=p[**1**,**2**]/(p[**1**,**1**]+p[**1**,**2**]);

else if (mode[i]=**82** | mode[i]=**83**) then value=p[**1**,**1**];

else if (mode[i]=**22** | mode[i]=**23**) then value=p[**1**,**2**];

else if (mode[i]=**31** | mode[i]=**32**) then value=p[**1**,**2**]\*h[**2**];

if value>**0** then sum=sum+num[i]\*log(value);