# **Magnusson Paper Notes for Continuous Outcome(Y) [With Covariates]**

Model Y:

where is a mixture of two normal means, defined as follows:

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| Code notation | mu0\_mix | mu1\_mix |

In the table above . Namely:

|  |  |  |
| --- | --- | --- |
|  |  |  |
| Code notation: | mu0[i,j] | mu1[i,j] |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | where | where | where | where |
| Code notation: | pi1[i] | pi2[i] | pi3[i] | pi4[i] |

Model S:

A math equations and formulas

Description automatically generated with medium confidence

For each subject i:

|  |  |
| --- | --- |
|  | Code notation : |
|  | p1[i] = pi1[i] + pi2[i] |
|  | P0[i] = pi2[i] + pi4[i] |

ACE Calculation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | ACE Calculation |
|  | observed | S1[i] ~ dbern(p1[i]) | observed | Y1[i] ~ dnorm(mu1\_mix[i], sigma2) | Strata Membership defined by  Within each stratum, compute the mean of |
|  | observed | S1[i] ~ dbern(p1[i]) | Y0[i] ~ dnorm(mu0\_mix[i], sigma2) | observed |
|  | S0[i] ~ dbern(p0[i]) | Observed | observed | Y1[i] ~ dnorm(mu1\_mix[i], sigma2) |
|  | S0[i] ~ dbern(p0[i]) | Observed | Y0[i] ~ dnorm(mu0\_mix[i], sigma2) | observed |

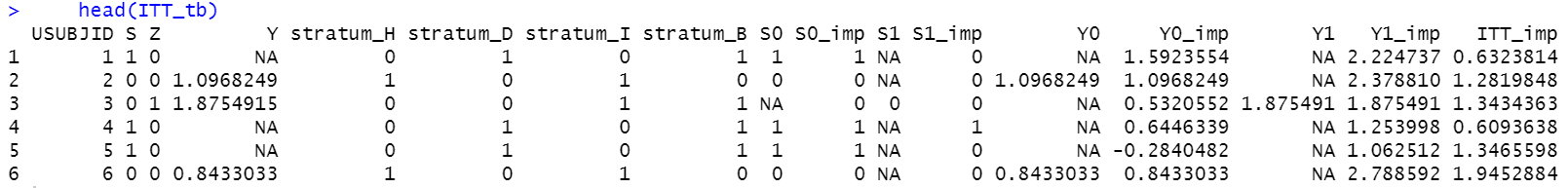
**In R code:**

Current code is built based on the following data structure:

A number and numbers on a white background

Description automatically generated

After the BUGS MCMC procedure, an ITT table will be generated for each iteration under each simulated dataset:



ITT\_tb column notation:

‘stratum\_X’ : indicate possible strata membership, depending on the observed S(Z).

‘S0’ : equals the observed S when Z=0.

‘S1’ : equals the observed S when Z=1.

‘S0\_imp’ : equals S0 if Z=0; generated by model if Z=1.

‘S1\_imp’ : equals S1 if Z=1; generated by model if Z=0.

‘Y0’ : equals the observed Y when Z=0. [set to NA if either ‘S=1’ or ‘Z=1’ is true.]

‘Y1’ : equals the observed Y when Z=1. [set to NA if either ‘S=1’ or ‘Z=0’ is true.]

‘Y0\_imp’ : equals Y0 if Z=0; generated by model if Y0=NA.

‘Y1\_imp’ : equals Y1 if Z=1; generated by model if Y1=NA.

‘ITT\_imp’ : equals Y1\_imp - Y0\_imp

Finally, ACE is calculated as the mean(ITT\_imp) within each stratum. Stratum membership is determined by (S0\_imp, S1\_imp).

**Coding Steps**

* Compute  **matrix** (indicate possible strata membership for each subject

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Strata | H | D | I | B |
|  | 1 | 0 | 1 | 0 |
|  | 0 | 0 | 1 | 1 |
|  | 0 | 1 | 0 | 1 |
|  | 1 | 1 | 0 | 0 |
| Code notation | I[i, 1] | I[i, 2] | I[i, 3] | I[i, 4] |

* Compute

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | H | D | I | B |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | Where | | | |
| Code notation | expa[i,1] | expa[i,2] | expa[i,3] | expa[i,4] | pi1[i] | pi2[i] | pi3[i] | pi4[i] |

* Compute mixture-weight probabilities **w[i,j]**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S,Z | expa[i,j] \* I[i,j] | | | | pi[i] \* I[i,j] | | | | Mixture weight prob = | | | |
| 0,0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |
| 0,1 | 0 | 0 |  |  | 0 | 0 |  |  | 0 | 0 |  |  |
| 1,0 | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  |
| 1,1 |  |  | 0 | 0 |  |  | 0 | 0 |  |  | 0 | 0 |
|  |  | | | | where | | | | where | | | |
| Code notation |  |  |  |  |  |  |  |  | w[i,1] | w[i,2] | w[i,3] | w[i,4] |

* Compute

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | components (two zeros, two non-zeros in each row i)  wmu0[i,j]) | | | |  |
|  |  |  |  |  | mu0[i,1]  \*  w[i,1] | mu0[i,2]  \*  w[i,2] | mu0[i,3]  \*  w[i,3] | mu0[i,4]  \*  w[i,4] | Sum(wmu0[i,]) |
| Code notation | mu0[i,1] | mu0[i,2] | mu0[i,3] | mu0[i,4] | Wmu0[i,1] | Wmu0[i,2] | Wmu0[i,3] | Wmu0[i,4] | Mu0\_mix |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | components (two zeros, two non-zeros in each row i)  Wmu1[i,j]) | | | |  |
| Code notation | mu0[i,1]  +  delta[1] | mu0[i,2]  +  delta[2] | mu0[i,3]  +  delta[3] | mu0[i,4]  +  delta[4] | mu1[i,1]  \*  w[i,1] | mu1[i,2]  \*  w[i,2] | mu1i,3]  \*  w[i,3] | mu1[i,4]  \*  w[i,4] | Sum(wmu1[i,]) |