0708-1

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Single continuous outcome

Structure & Relationship

Outcome : Y Exposure : A,B,C Covariates : D,F,G,H

relationship:

$$E(Y|A,B,C,D,F,G,H) \sim N(\mu,\sigma)$$

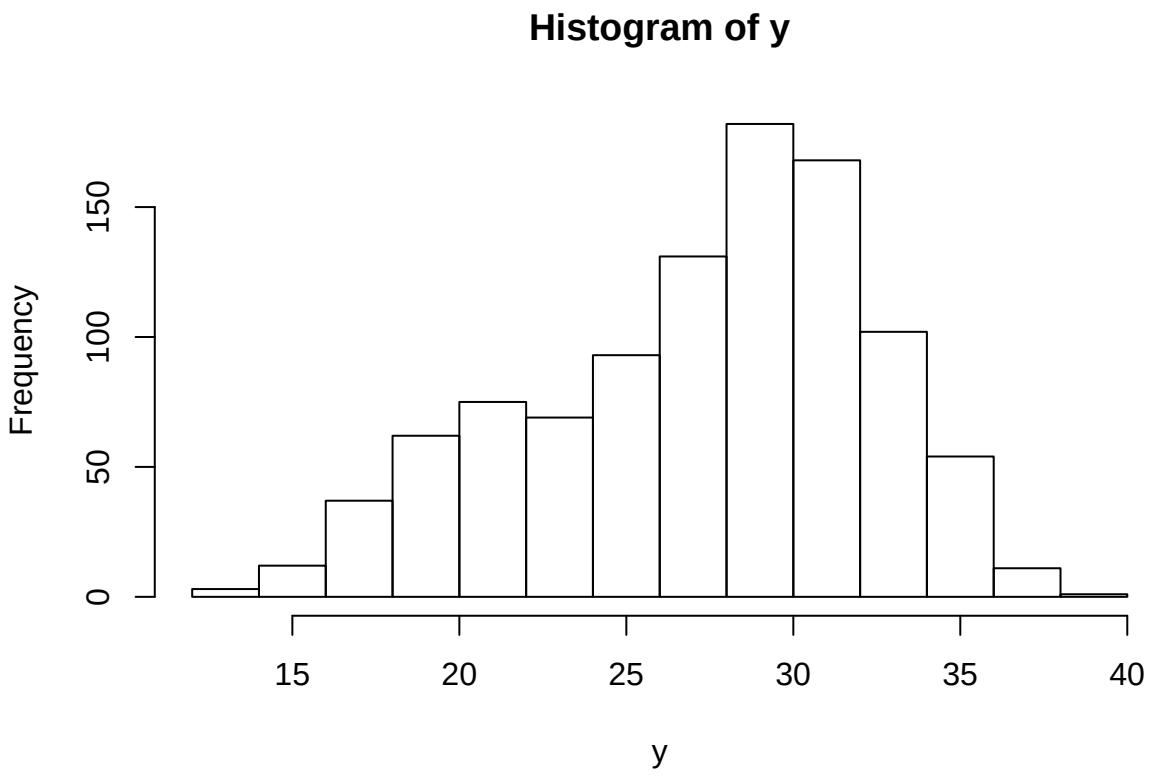
$$E(A|D,F,G,H) \sim N(\mu,\sigma)$$
$$E(B|D,F,G,H) \sim N(\mu,\sigma)$$
$$E(c|D,F,G,H) \sim N(\mu,\sigma)$$

$$E(D) \sim bin(0.7)$$
$$E(F) \sim N(30,5)$$
$$E(G) \sim N(120,5)$$
$$E(H) \sim Poi(20)$$

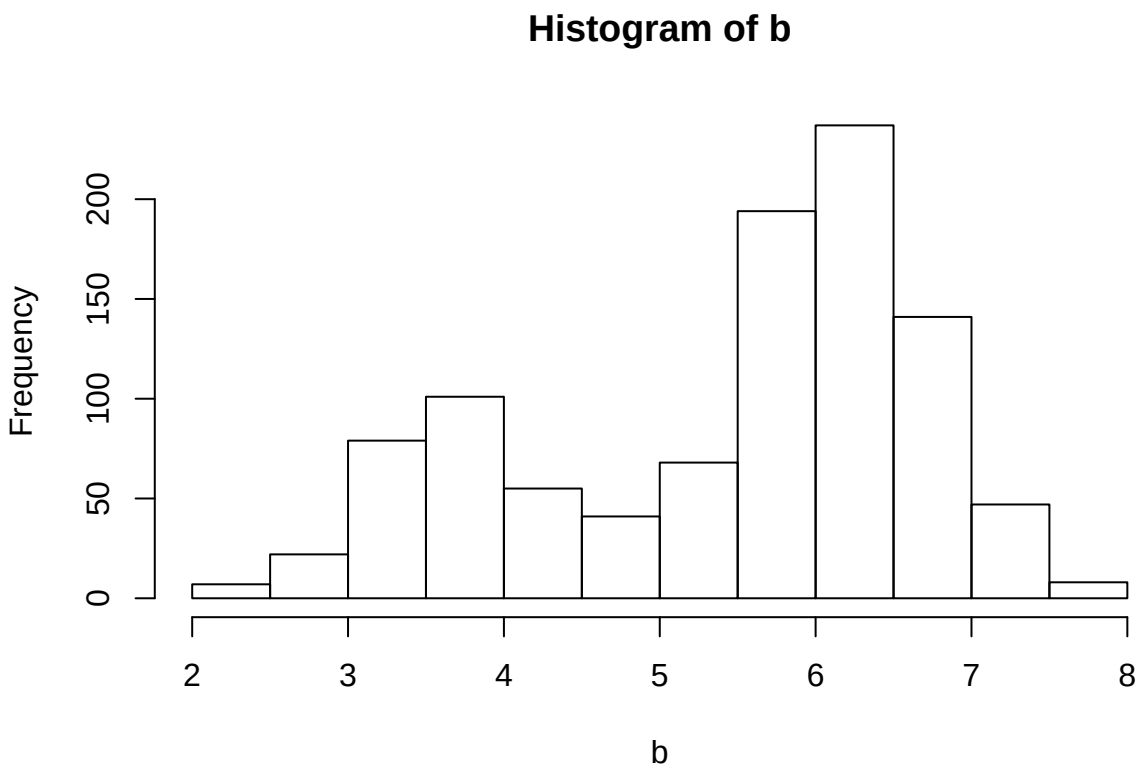
1.First: try with small sample

```
n = 1000

#covariates
d = rbinom(n,1,0.7)
e = rnorm(n,30,5)
f = rnorm(n,120,5)
h = rpois(n,20)

#exposures

b = 2.5*d+0.027*e+0.018*f+0.035*h +rnorm(n,0,0.5)
c = 1.5*d+0.013*e+0.008*f+0.35*h+rnorm(n,0,0.5)
d = 3.5*d+0.07*e+0.002*f+0.05*h+rnorm(n,0,0.5)

#response
```

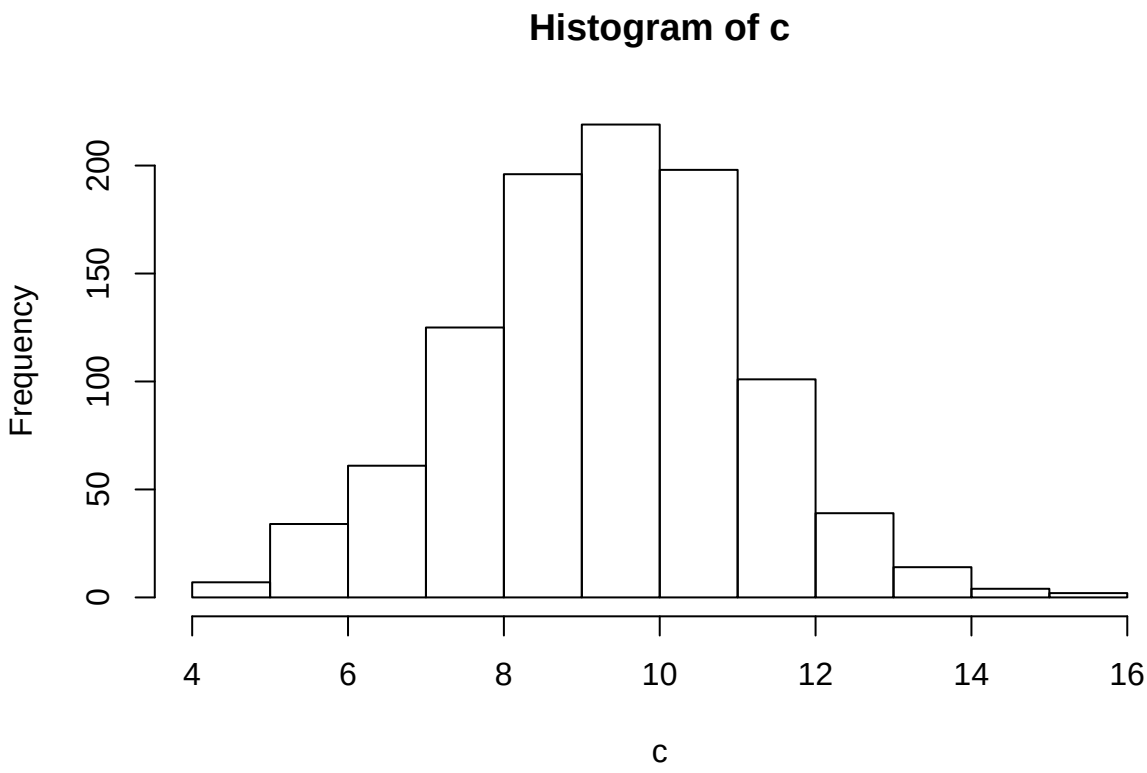
```r
y = 0.26*b+0.35*c+0.87*d+1.3*d+0.072*e+0.008*f+0.35*h+rnorm(n,0,0.5)


hist(y)
```



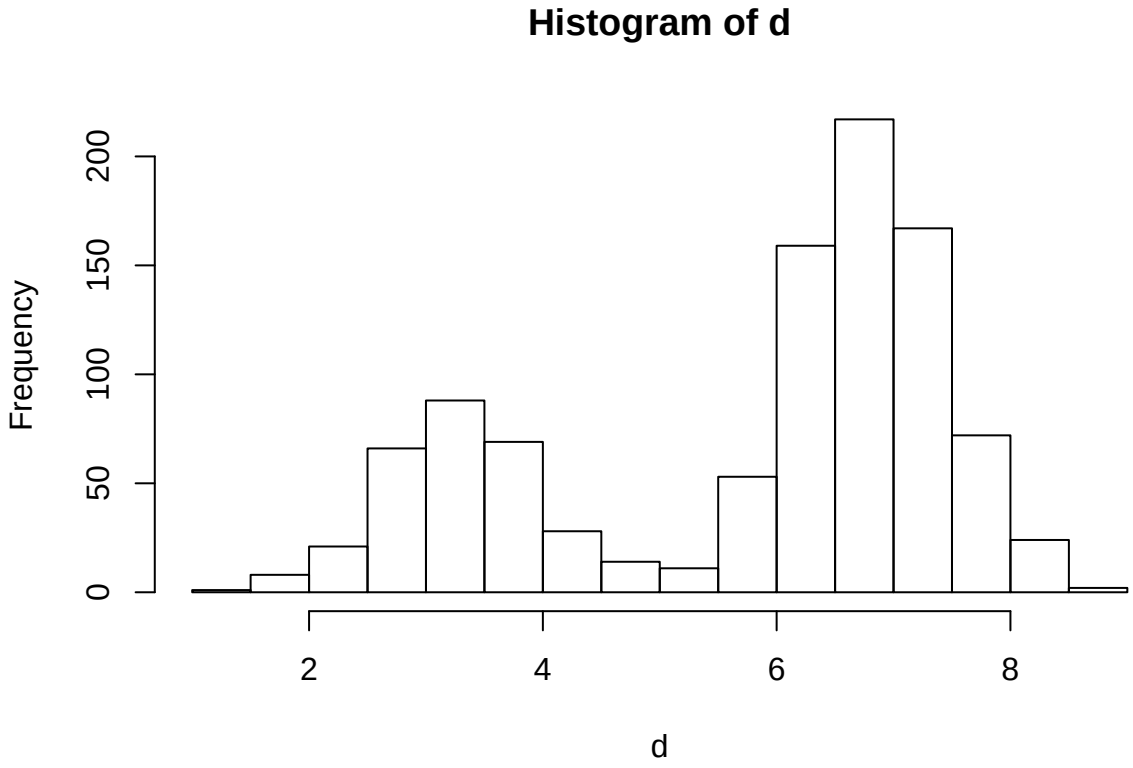

```r
hist(b)
```


Histogram of b
Frequency
0
50
100
150
200
2
3
4
5
6
7
8
b

```
hist(c)
```


Histogram of c
Frequency
0
50
100
150
200
4
6
8
10
12
14
16
c

```
hist(d)
```



2.g-formula

$$g^* = f(a) = f(as, mn, pb) = f(as|mn, pb) * f(mn|pb) * f(pb)$$

$$E[Y_g*] = \int_a \int_c E(Y|A, C) * f^*(a) * f(c) dcda$$

3.marginal structual model