Decline in HRT Usage and Breast Cancer Incidence in 17 countries

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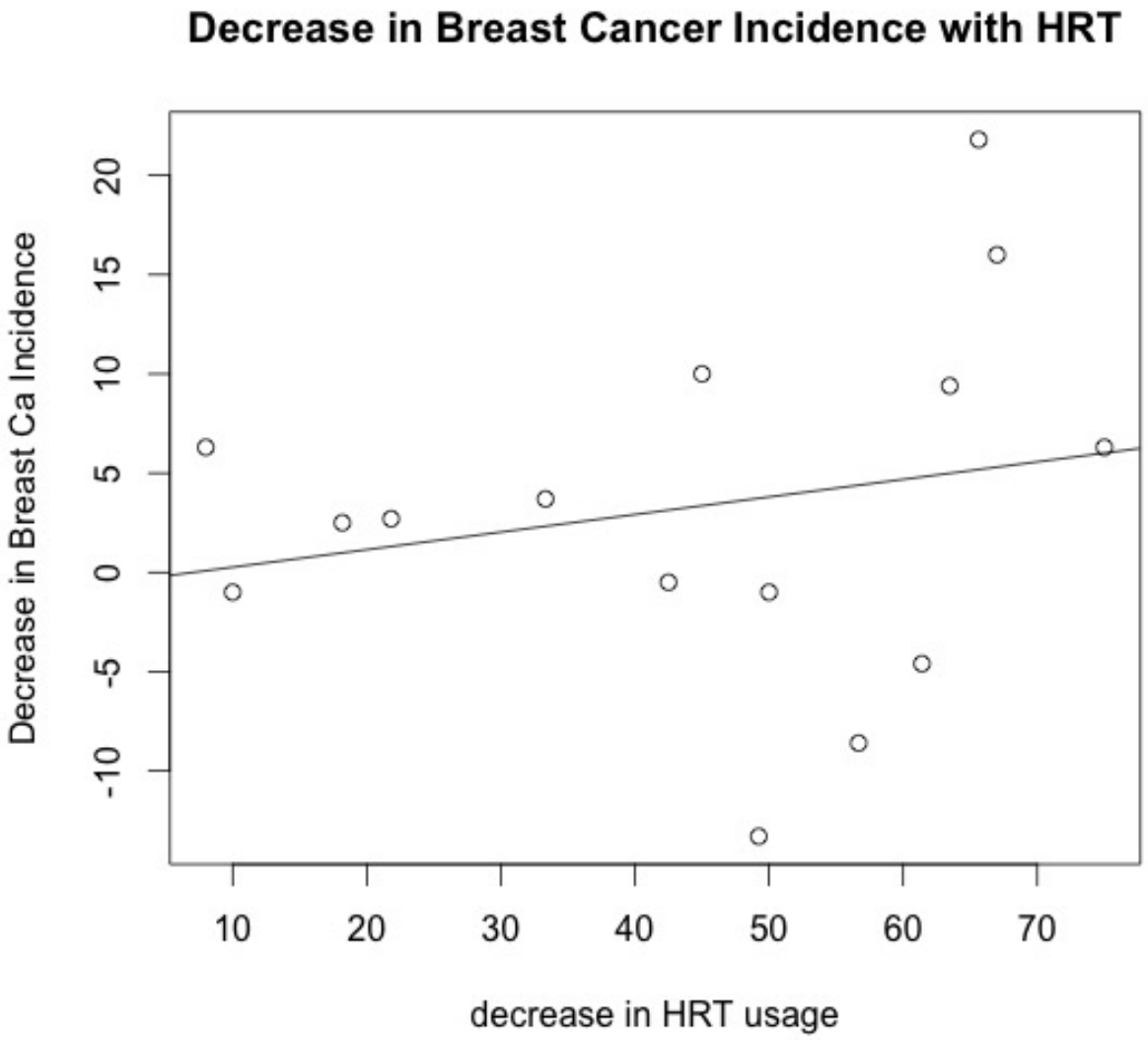
The purpose of this document is to describe the association between the decline in the contains the R codes for the breast cancer study.

```
## set the working directory

Mywd <- setwd("/Users/arindambose/GitHub/brca-study")

## Read the data into R

mydata <- read.csv("breastca.csv", header = TRUE, sep = ",")
mydata$hrtuse2 <- (mydata$declinehrtuse)^2
```

We regressed the decline in breast cancer incidence on the percentage decline in the usage of HRT in the countries studies. The

```
 plot(mydata$declinehrtuse, mydata$cadecrease,
     main = "Decrease in Breast Cancer Incidence with HRT",
    ylab = "Decrease in Breast Ca Incidence",
    xlab = "decrease in HRT usage")

abline(cahrt <- lm(mydata$cadecrease ~ mydata$declinehrtuse,
                   data = mydata))
```



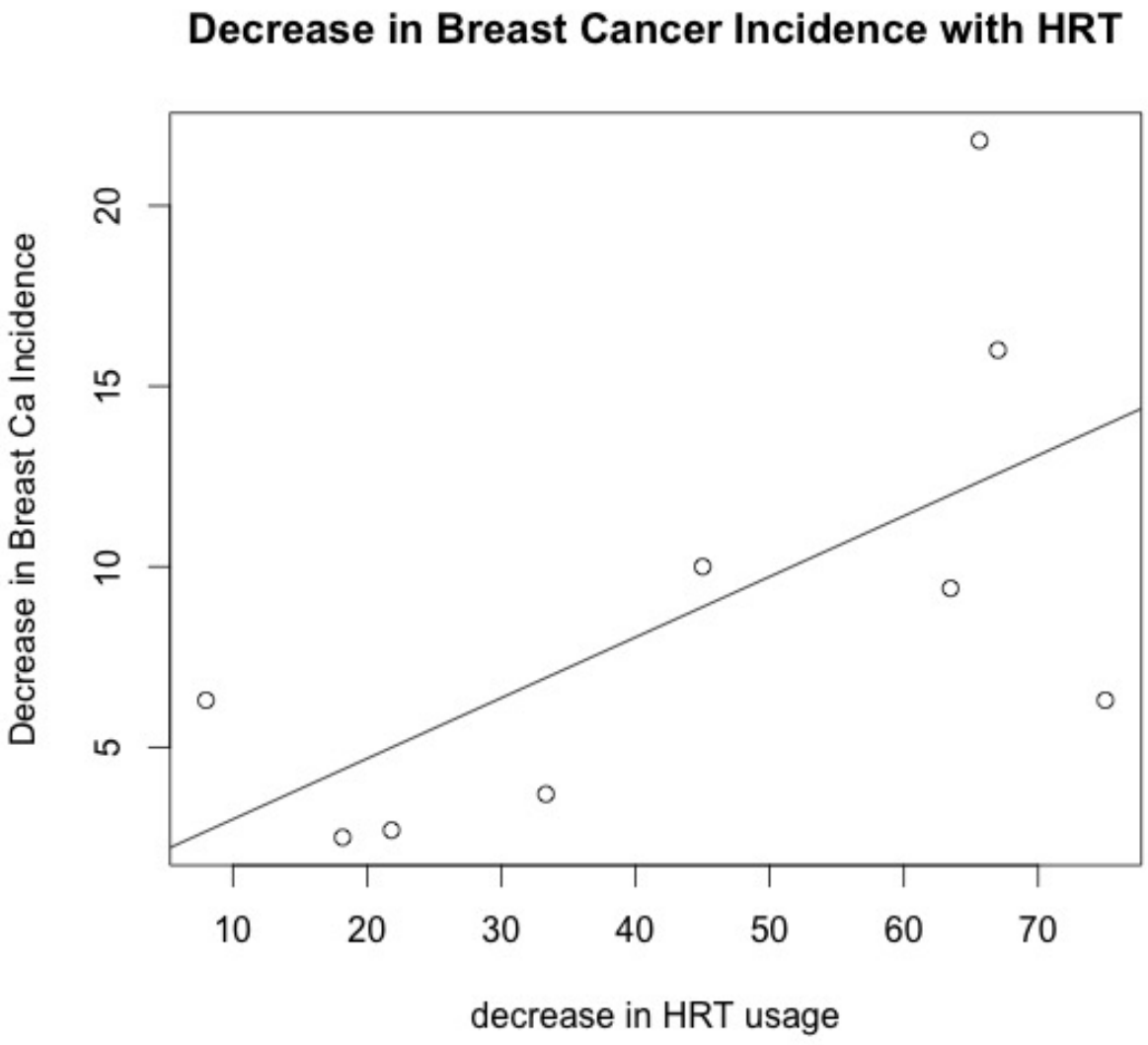

```
summary(cahrt)
```

```
##
## Call:
## lm(formula = mydata$cadecrease ~ mydata$declinehrtuse, data = mydata)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -17.034  -4.220   1.374   5.311  16.614
##
## Coefficients:
##                      Estimate Std. Error t value Pr(>|t|)
## (Intercept)          -0.62479    5.53244  -0.113    0.912
## mydata$declinehrtuse  0.08853    0.11251   0.787    0.445
##
## Residual standard error: 9.132 on 13 degrees of freedom
```

```
##   (6 observations deleted due to missingness)
## Multiple R-squared:  0.04546,    Adjusted R-squared:  -0.02796
## F-statistic: 0.6192 on 1 and 13 DF,  p-value: 0.4455
```

As can be seen from the results, there is a small and statistically non-significant increment in the decline rates in breast cancer incidence (beta = 0.085, p = 0.45). In addition to this, we also get to see that for five countries, while HRT usage declined, this was not followed by corresponding decline in Breast cancer incidence in those countries. For these countries, there were increment in the incidence rates of breast cancer.

Next, we remove data where the decrease in breast cancer were < 0, that is where we noted that breast cancer incidence increased even while the rates of usage of HRT declined.




```
##
## Call:
## lm(formula = mydata2$cadecrease ~ mydata2$declinehrtuse, data = mydata2)
##
## Residuals:
```

```
##    Min     1Q Median     3Q    Max
## -7.628 -2.590 -1.878  3.416  9.447
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)             1.3222     3.8064   0.347   0.7385
## mydata2$declinehrtuse   0.1681     0.0762   2.206   0.0632 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.337 on 7 degrees of freedom
## Multiple R-squared:   0.41,  Adjusted R-squared:  0.3258
## F-statistic: 4.865 on 1 and 7 DF,  p-value: 0.06319
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.500   3.700   6.300   8.744  10.000  21.800
```

Selecting only those countries that showed decline in breast cancer incidence and HRT usage as well shows a sharper decline rate (beta = 0.17, p = 0.06). This was further tested by examining by creating a binary variable on the basis of the median of the rate of decline (median percentage for the rate of decline in breast cancer incidence was 6.3%, and this was used to classify the countries with decline as high and low). Alternatively, using the tertiles (33 rd percentiles, the countries with different decline rates were classified)

```
##   highredca declinehrtuse
## 1     FALSE        31.266
## 2      TRUE        60.275
```

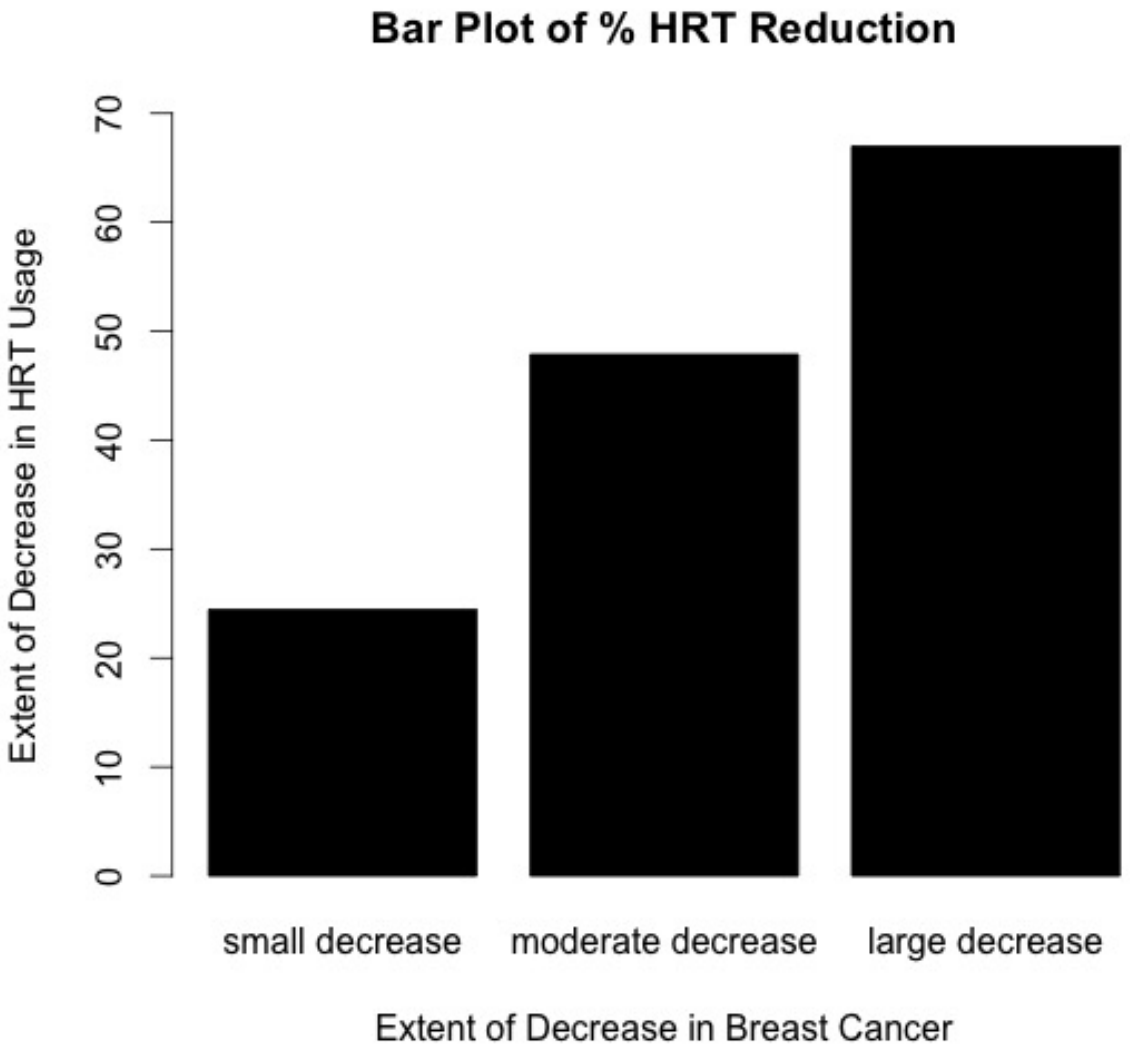
As can be seen, for countries that registered more than 6% decline in the breast cancer incidence, the decline in HRT usage was 60.2 percent, nearly twice that of the countries with relatively smaller rate of decline in breast cancer incidence.

```
##
##  (0,3.7] (3.7,10]  (10,21]
##        3        4        1
```

```
##  (0,3.7] (3.7,10]  (10,21]
## 24.44333 47.86750 67.00000
```

As can be seen, the decline in HRT usage was around 67% for the country with over 10% decline in breast cancer decline, while for countries where the decline in breast cancer was less than 4%, there was a decline in HRT usage of around 24%; together, these findings suggest that with progressive decline in HRT usage, there were corresponding decline in breast cancer incidence as well. This was examined in the plot below.

```
barplot(hrtcadeclevel,
        col = "black", main = "Bar Plot of % HRT Reduction",
        xlab = "Extent of Decrease in Breast Cancer",
        ylab = "Extent of Decrease in HRT Usage",
       names.arg = caredcatnames,
        ylim = c(0, 70))
```


Bar Plot of % HRT Reduction
Extent of Decrease in HRT Usage
0
10
20
30
40
50
60
70
small decrease
moderate decrease
large decrease
Extent of Decrease in Breast Cancer