Exploratory Data Analysis for Salicylates and BP

The initial chemical concentration dataset has five Salicylates and three different types of BPs. However, for chemicals that have detection frequency above 50%, we are left with three Salicylates and all three BPs.

These are: “Hexyl Salicylate”, “Benzyl Salicylate”, “2-Ethyhexyl Salicylate”, “BP”, “BP-3” and “BP-8”.

In this phase, we have relatively more data observations to look at. There are in total 44 houses in our dataset The following are the houses with 0 to 12 months period recorded:

“NHAQS-028” “NHAQS-029” “NHAQS-030” “NHAQS-031” “NHAQS-032” “NHAQS-034” “NHAQS-036”

There are 8 houses have 1 period recorded.

10 houses have 2 periods recorded.

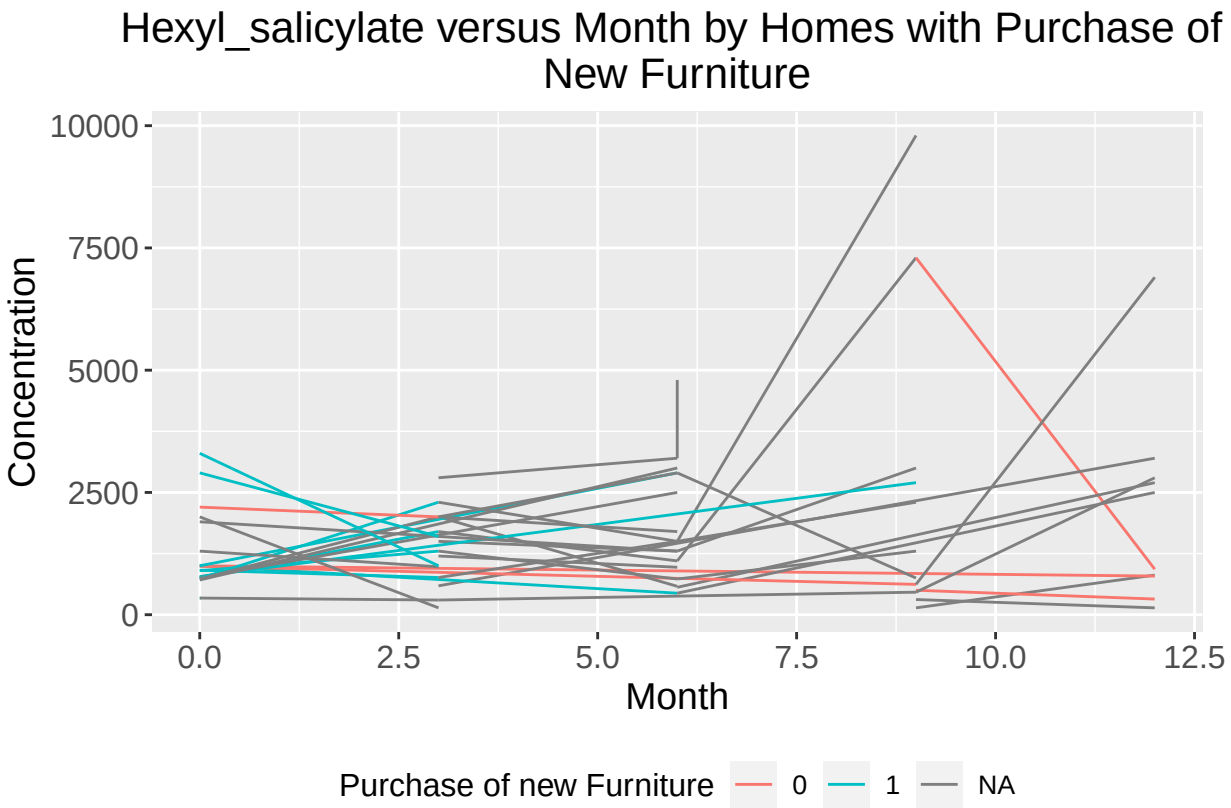
7 houses have 3 periods recorded.

12 houses have 4 periods recorded.

5 houses have 5 periods (0, 3, 6, 9, 12) recorded.

2 houses have 6 periods (0, 3, 6, 9, 12, other unusual period value e.g. Blank) recorded.

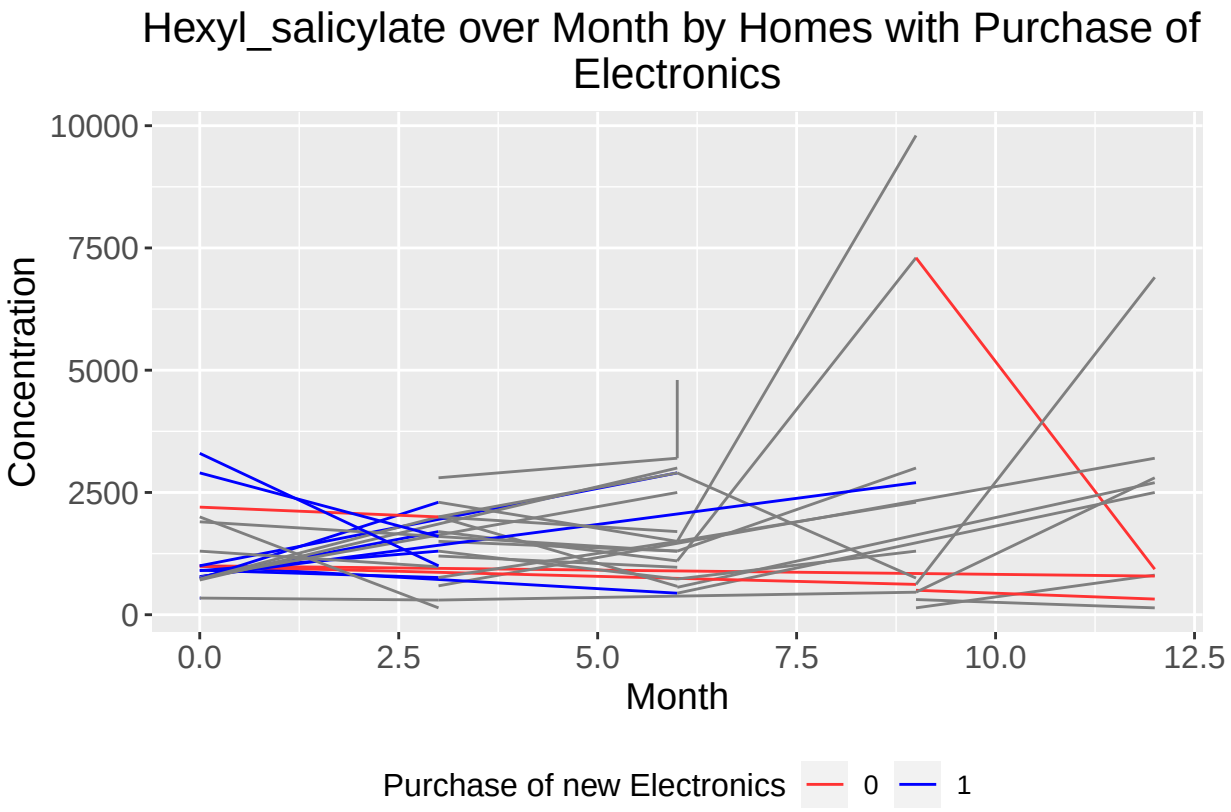
Potential Impact of Purchase of New Furniture



When we look at the above graph. For Hexyl Salicylate, most of the blue lines (purchased new furniture) have a positive slope, and all red lines (didn’t purchase) have a negative slope, implying that the purchase of new furniture might have an influence on the increase in the level of Hexyl Salicylate.

However, for other chemicals, the trend seems to be random, and we could hardly draw any conclusion from it.

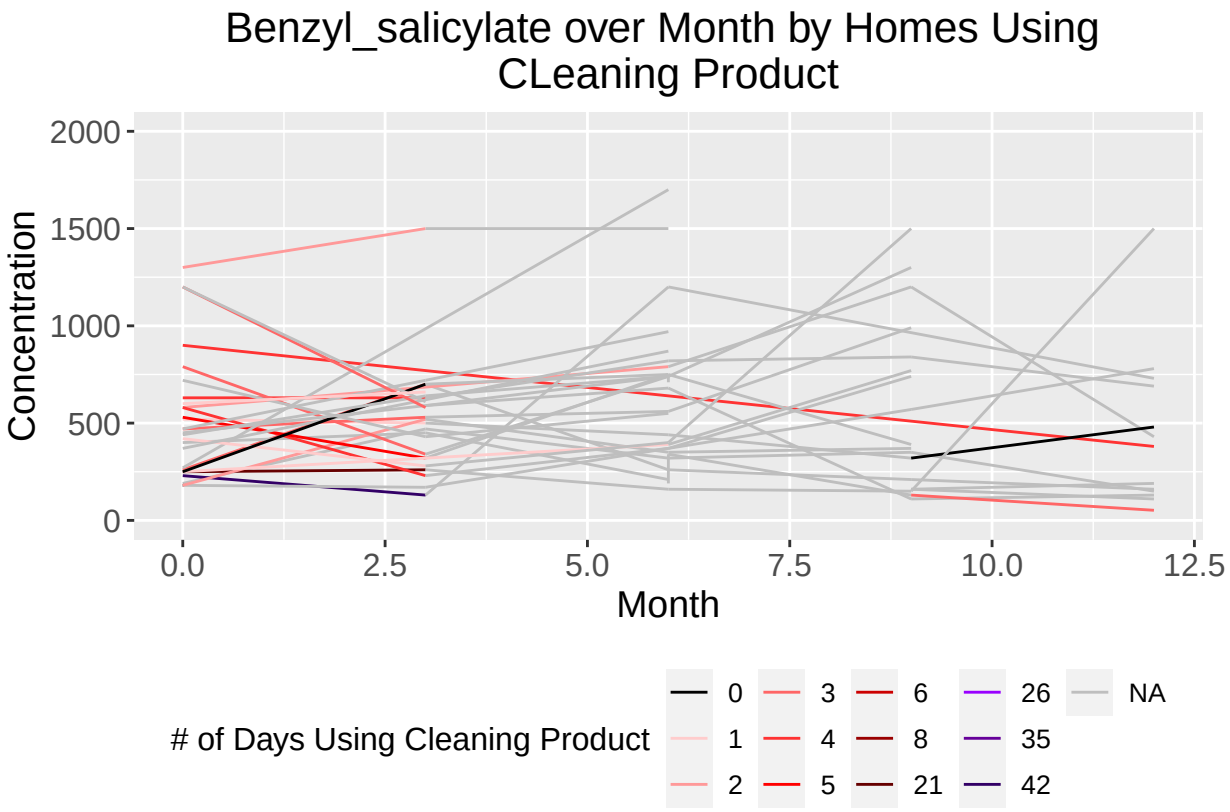
Potential Impact of Purchase of New Electronics



When we look at the graph for Hexyl Salicylate above, many blue lines (Purchased New Electronics) have positive slope and all red lines (Didn't purchase electronics) have nearly negative slope.

Similarly, if we look at other chemicals, we could not observe any significant trend regarding the purchase of new electronics.

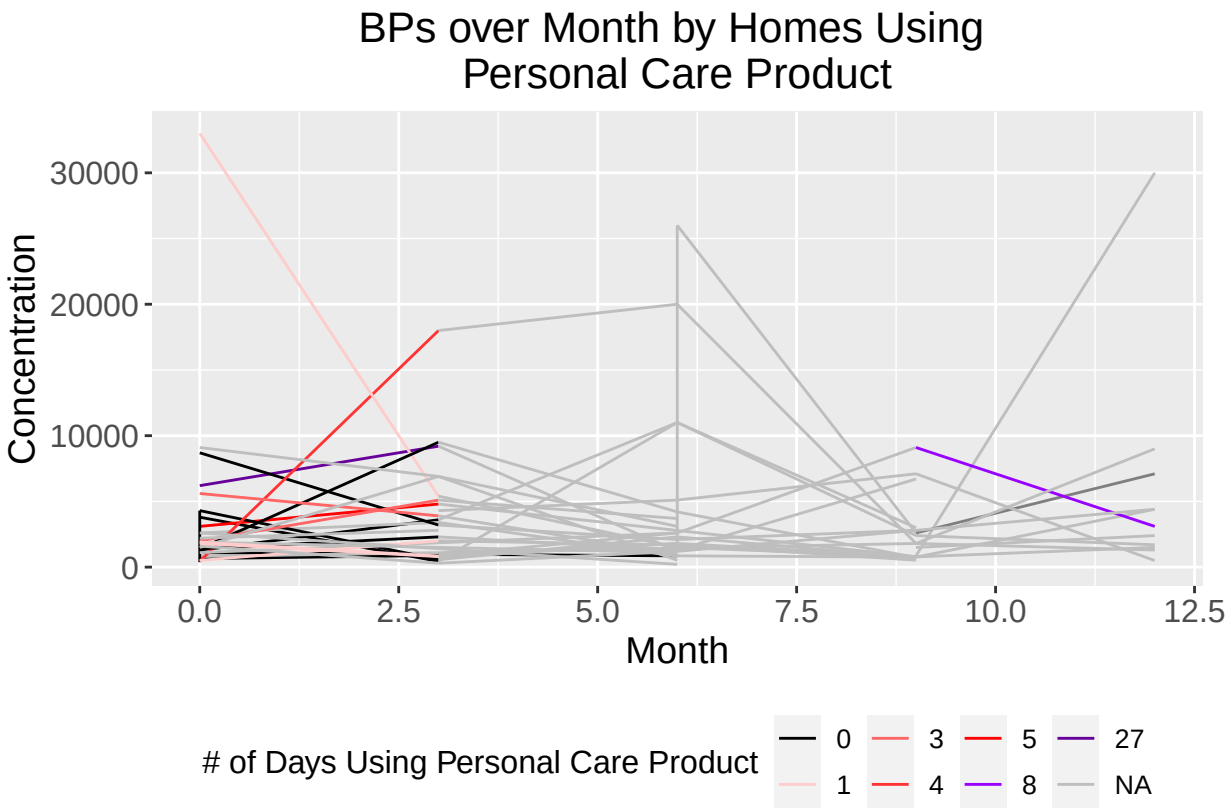
Potential Impact of Using Cleaning Products



For the usage of cleaning products, all chemicals from Salicylate and BP family appear to have a trend like the above graph, where we could not oberve anything significant, because the slope of the red lines and black lines appear to be random.

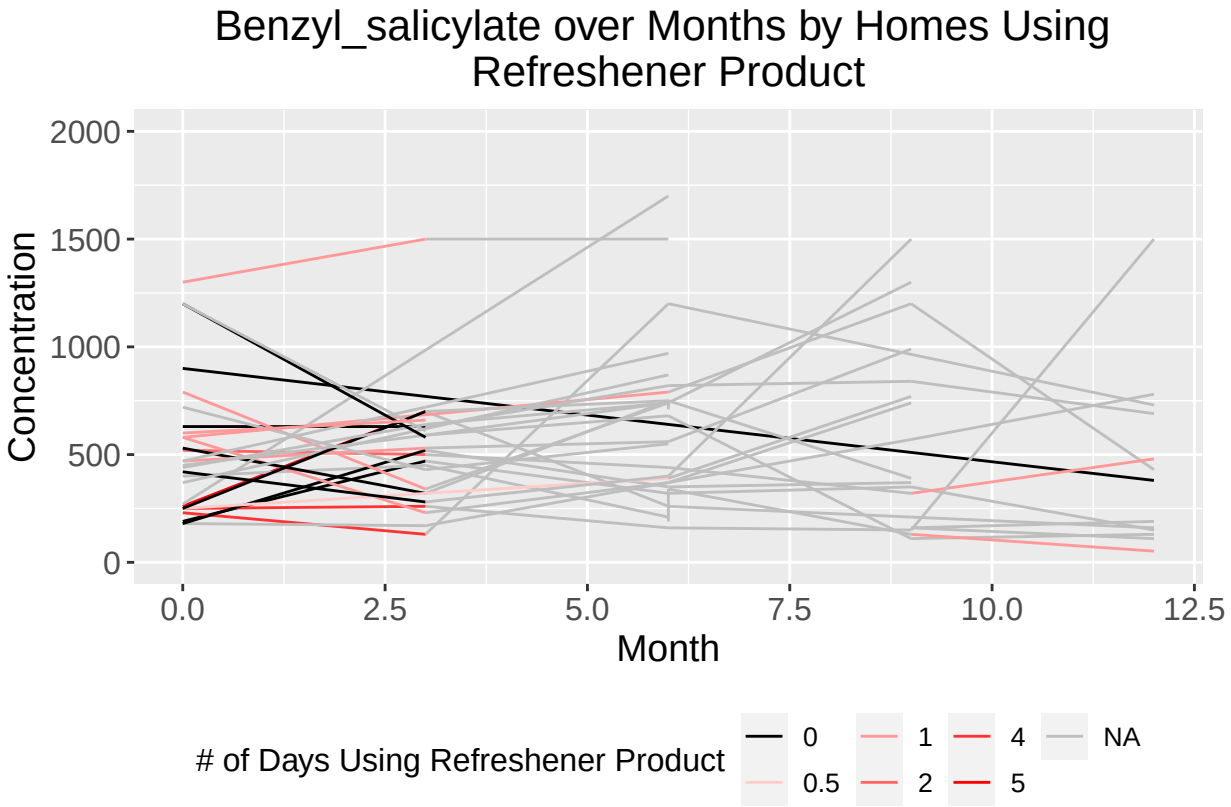
Thus, cleaning products might not be a suitable variable to model or draw a conclusion from.

Potential Impact of Using Personal Care Products



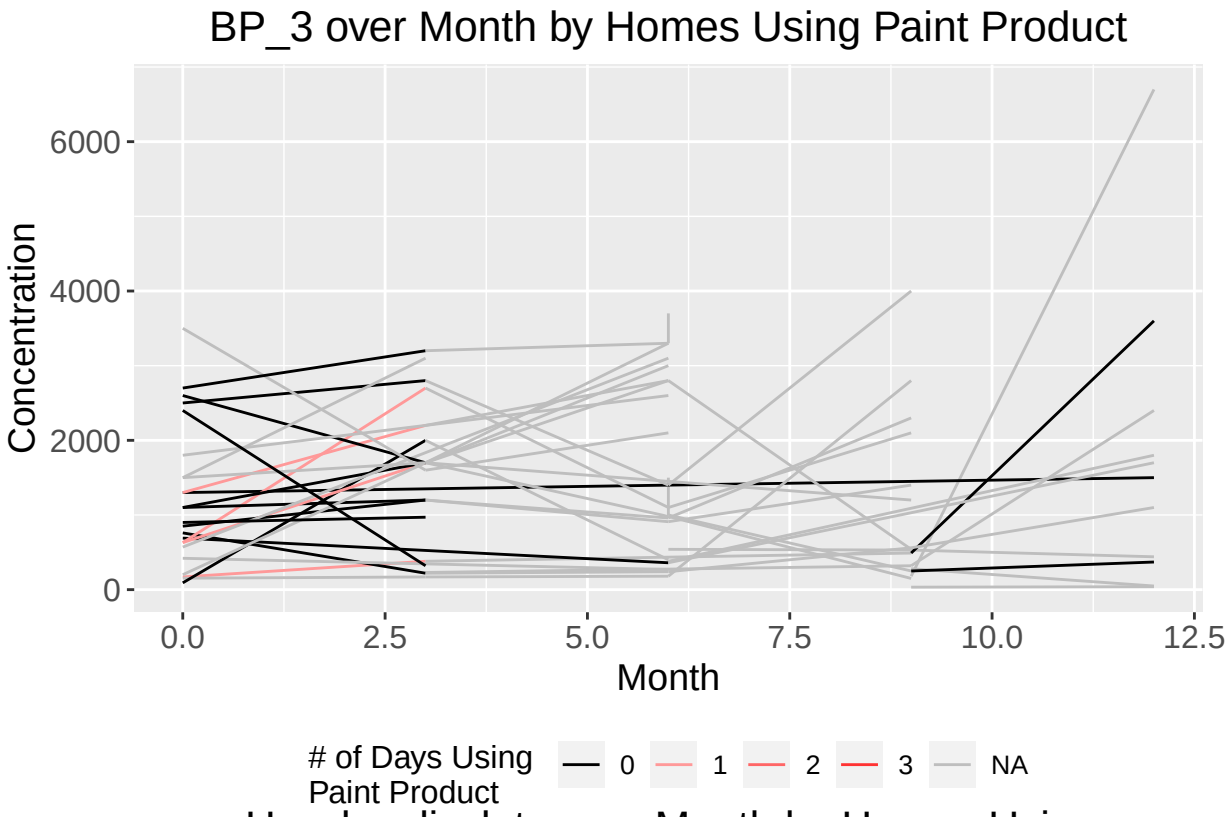
Looking at the above graph, most of the red/purple lines (used personal care products) have a positive slope, and most of the black lines (didn't use any) have a negative slope, so it is possible that personal care products could bring a impact on the BPs concentration.

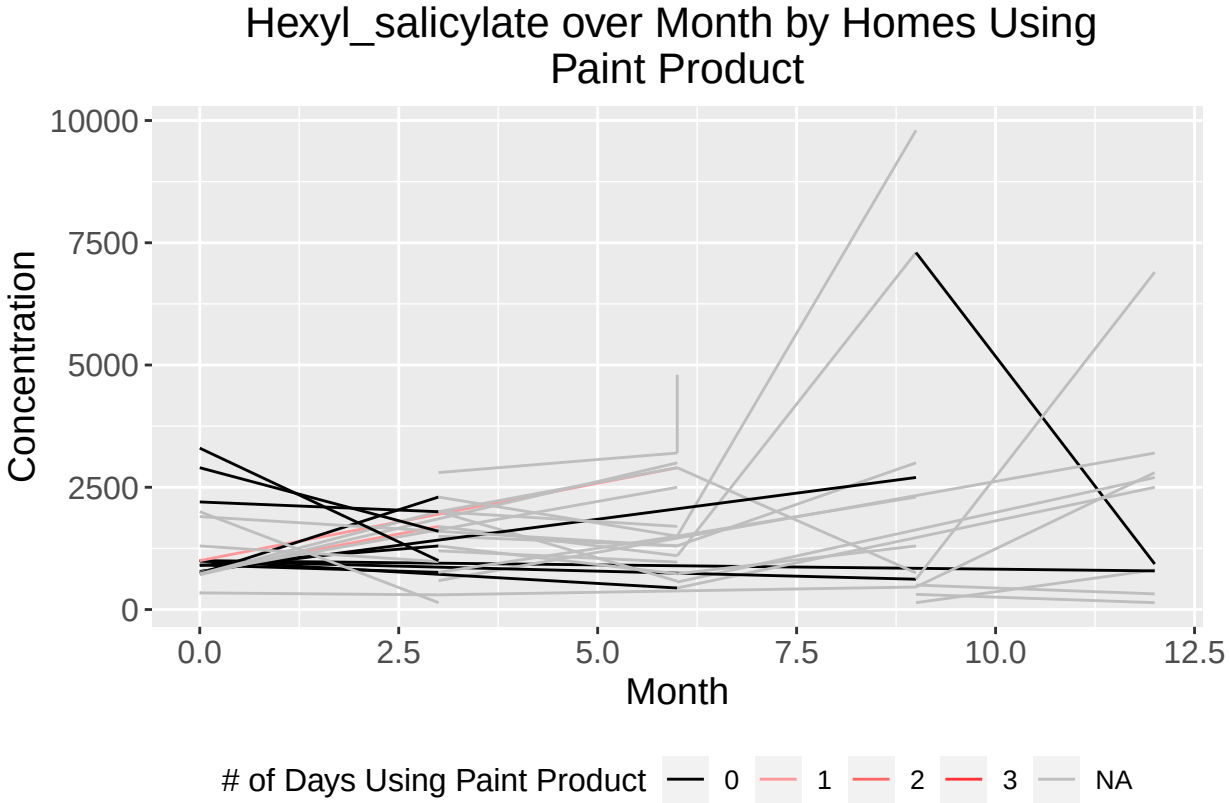
Potential Impact of Using Refreshener Products (Candles, Oil Diffuser, Air/Spray Refreshener)



All of the chemicals appear to have no significant trend like the above graph for Benzyl Salicylate, so refreshener products might not be suitable for modelling.

Potential Impact of Using Painting Related Products (Paint/Grease/Glue/Varnish)



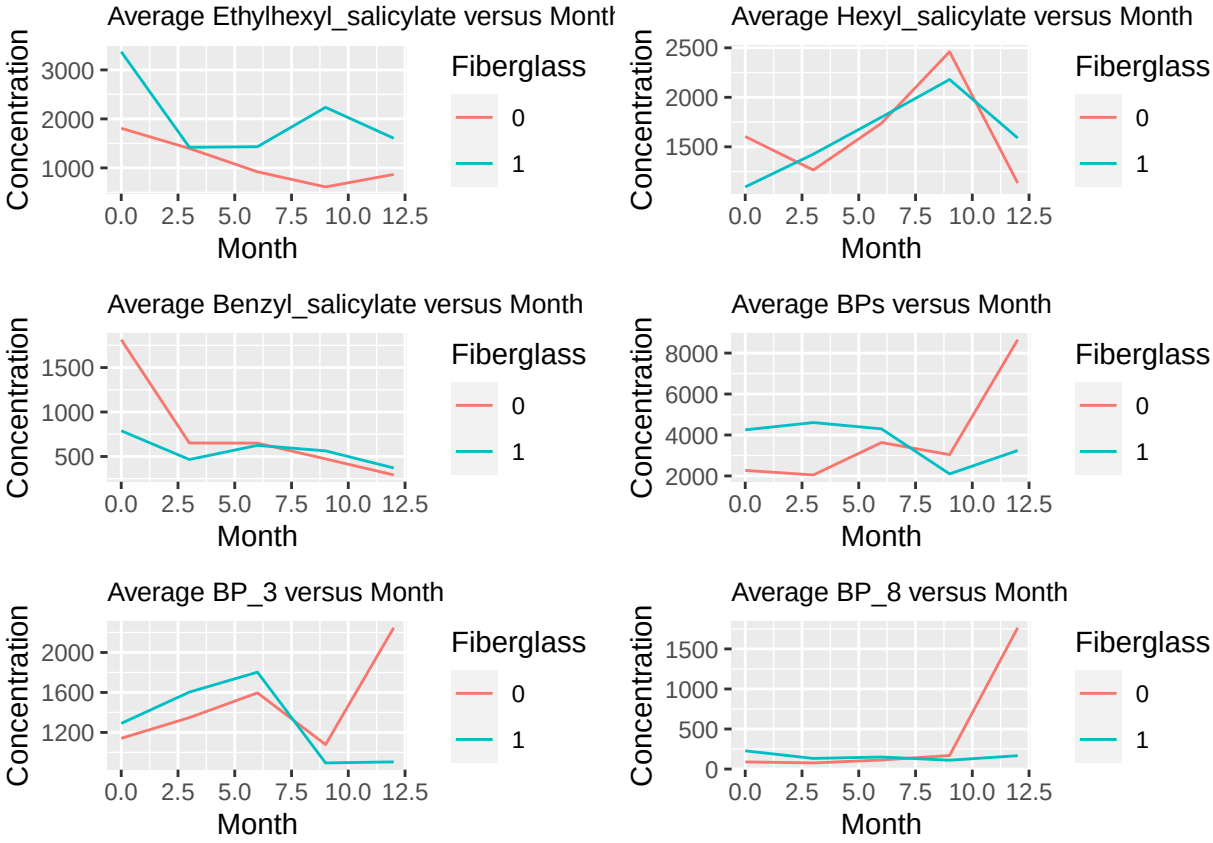


For BP3, all of red lines have a positive slope, and the black lines seem to be quite random. Also for Hexyl

Salicylate, most black lines have a negative slope, and all red lines have a positive slope. Both these two graphs suggested that the usage of painting related products would have an impact on the concentration level of both the Salicylate and BP. Thus, it is definitely worth looking at the painting products.

Average Concentration level for Homes with Different Insulation Material

```
## `summarise()` has grouped output by 'Period'. You can override using the
## `.groups` argument.
```




```
## `summarise()` has grouped output by 'Period'. You can override using the
## `.groups` argument.
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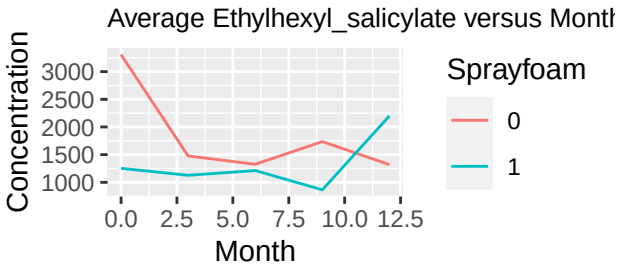
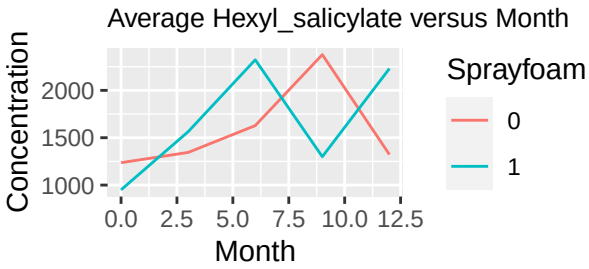
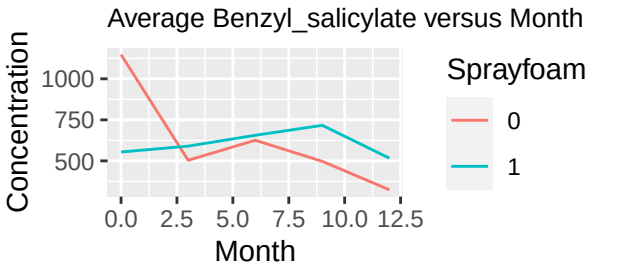
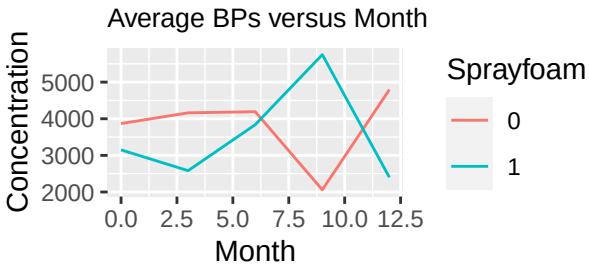
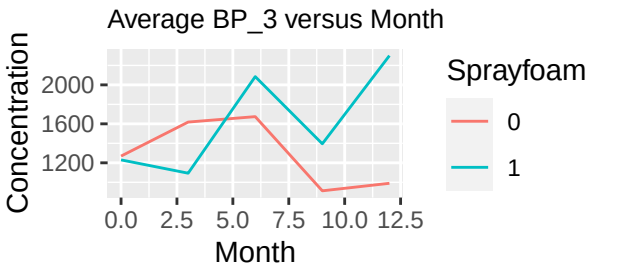
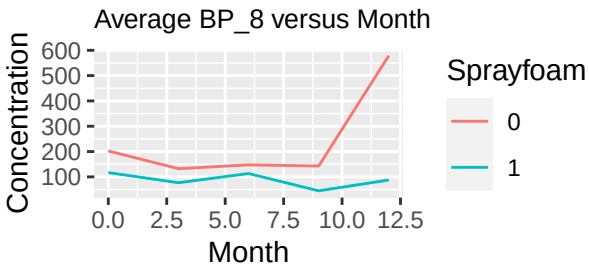






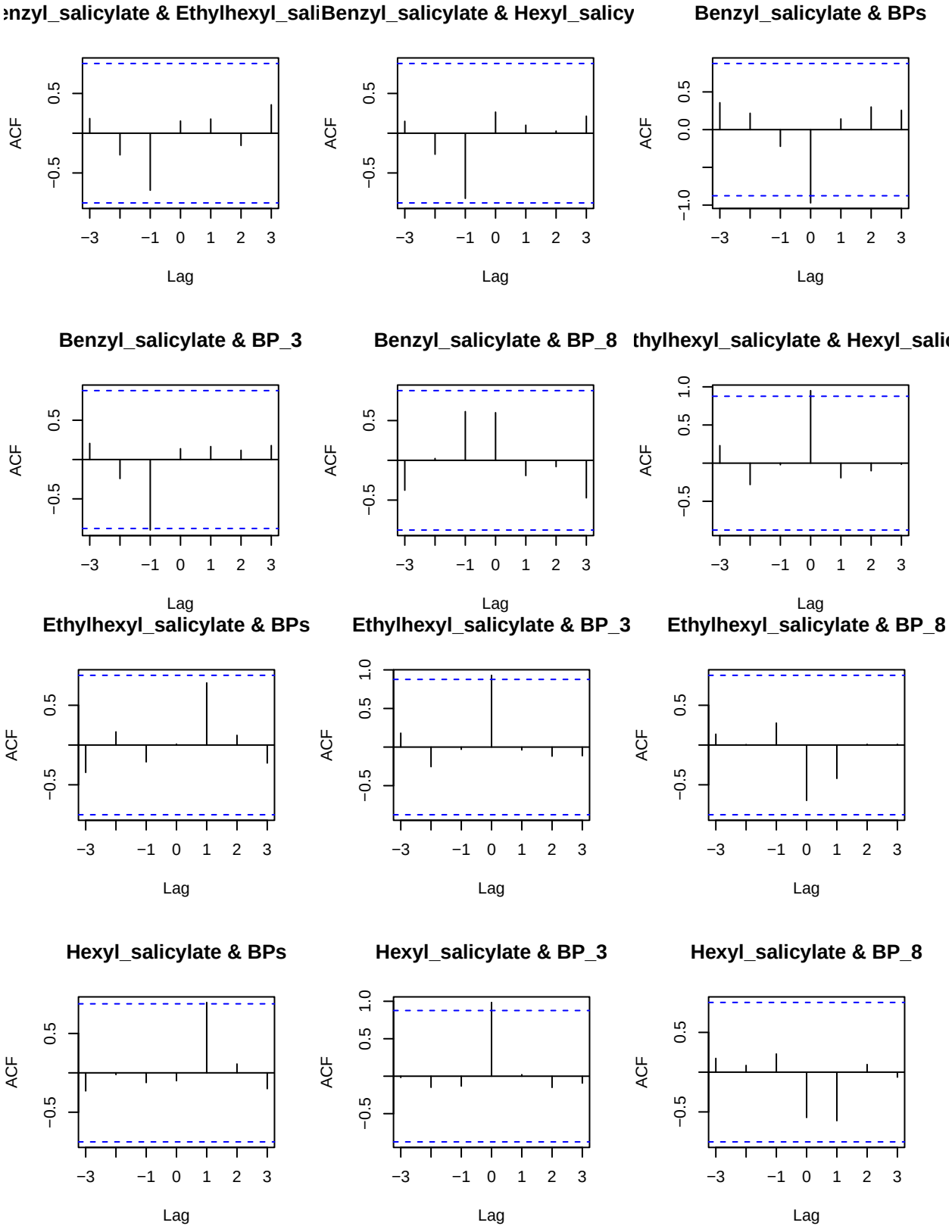


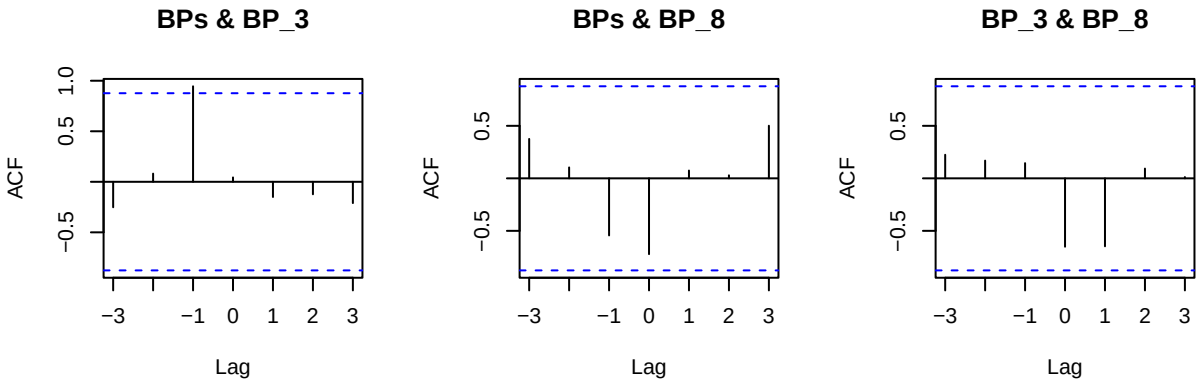




No obvious trend or trait can be drawn from the above graphs.

Cross-Correlation Analysis





House 32: BS & BPs at lag 0 BS & BP3 at lag -1 ES & HS at lag 0 ES & BP3 at lag -1 HS & BPs lag 1 BPs & BP3 lag -1 HS & BP3 lag 0

Looking at the above graphs, this suggests that for house32, many chemicals have similar trend almost at the same time or at a slightly different time, and it is also the case for some other houses with complete data as well.

Conclusion:

Painting products, Personal Care Products, Furnitures and Electronics seem to have an impact on the changes in the chemical concentrations for Salicylates and BPs. However, it is not the case for all the chemicals, but it is still worth diving deeper into these variables.