

Abstract

This study focused on finding the abundance of phthalates in personal care products. The purpose of this is to examine their abundance due to the effects of these toxins on the endocrine system. In previous work performed by Harley et. al., it was found that phthalates can be reduced in the endocrine system of adolescent individuals by avoiding products that contain phthalates.

The database used to collect data is the Environmental Working Group's Skin Deep cosmetic database. This database has recent and old personal care products that contain specific types of phthalates. This database helped with the collection of the types of phthalates used and in what products they are in. It was found that the most commonly used phthalate is polyethylene terephthalate, with it being used in 640 products, with 292 of those products being nail polish. It was also found that there are 12 other kinds of phthalates that are being regularly used in personal care products. These products can range anywhere from lipstick to sunscreen. Additionally, the database reflected the types of phthalates that are not recently being used to make certain products, however, these could still be present in previously purchased products. With this information we can see that there are still a multitude of products that contain harmful phthalates. This study is the foundation to future work looking at exposure to phthalates in adult populations and assessing sources of exposure.

Introduction

Endocrine disruption occurs when environmental chemicals at certain doses affect the performance of the endocrine system. Exposure to endocrine disruptors can interfere with normal development, reproduction, and the functions that hormones regularly control. One class of an environmental chemical that has the ability to negatively affect the endocrine system is phthalates. Phthalates are used to enhance the flexibility of plastics, making them common throughout personal care products such as nail polish and lip products. For example, phthalates are used to keep nail polish from drying out and becoming brittle and are used as solvents for perfumes and lubricants (Witorsch & Thomas, 2010). As the majority consumer of these kinds of products, women are at more risk of exposure to these chemicals (Harley et al, 2016). Phthalates can enter the body through a multitude of ways, such as dermal application of personal care products containing phthalates or inhalation of air containing phthalates (Witorsch & Thomas, 2010).

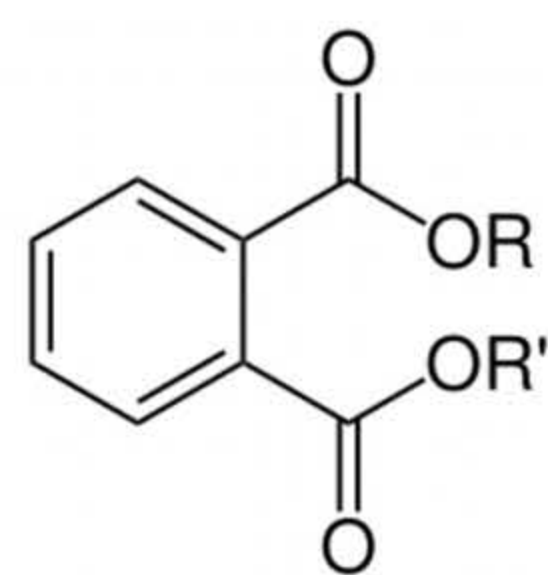


Figure 1: The chemical structure for a basic phthalate

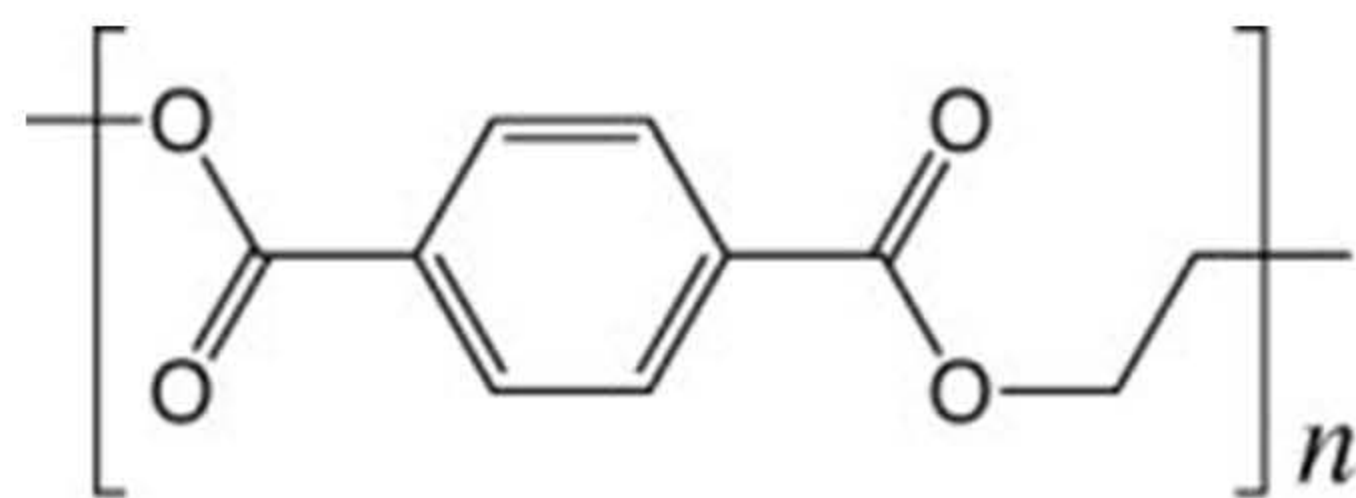
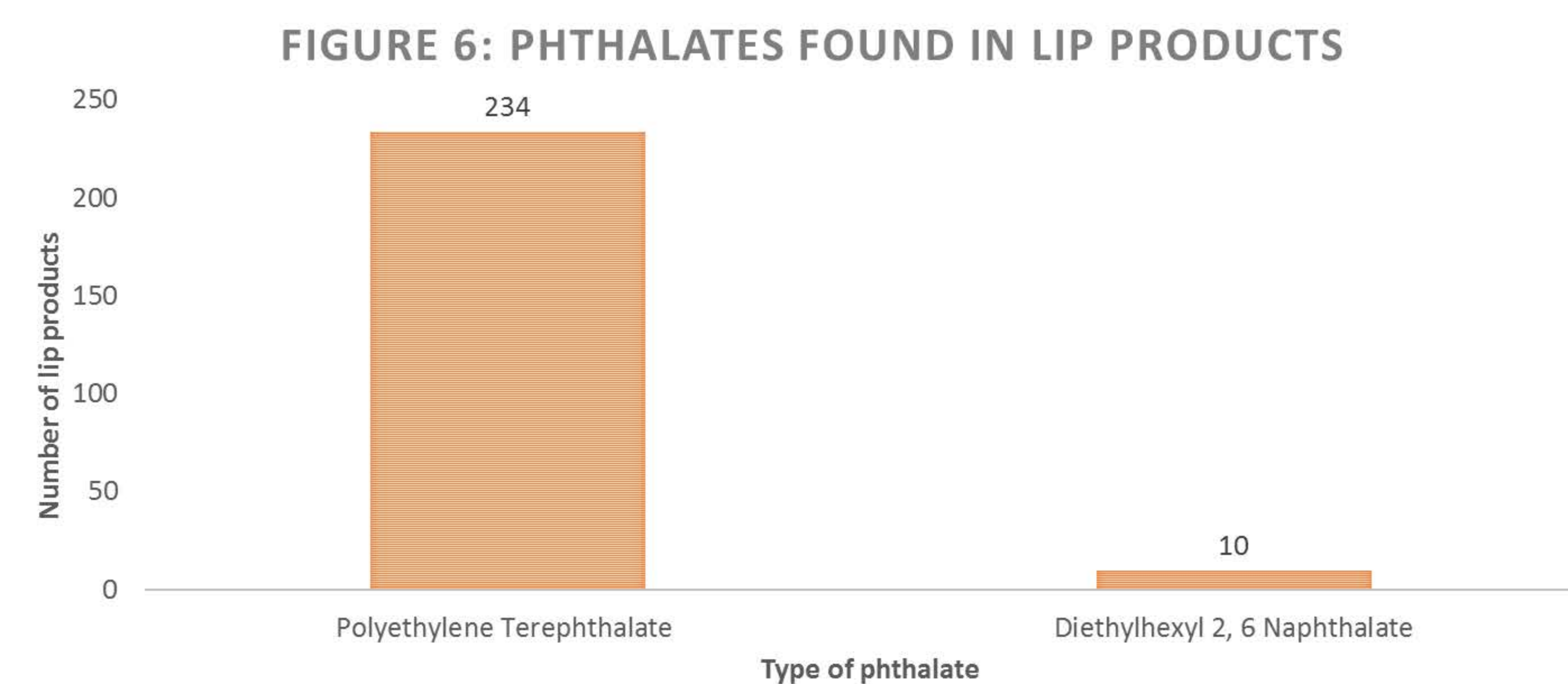
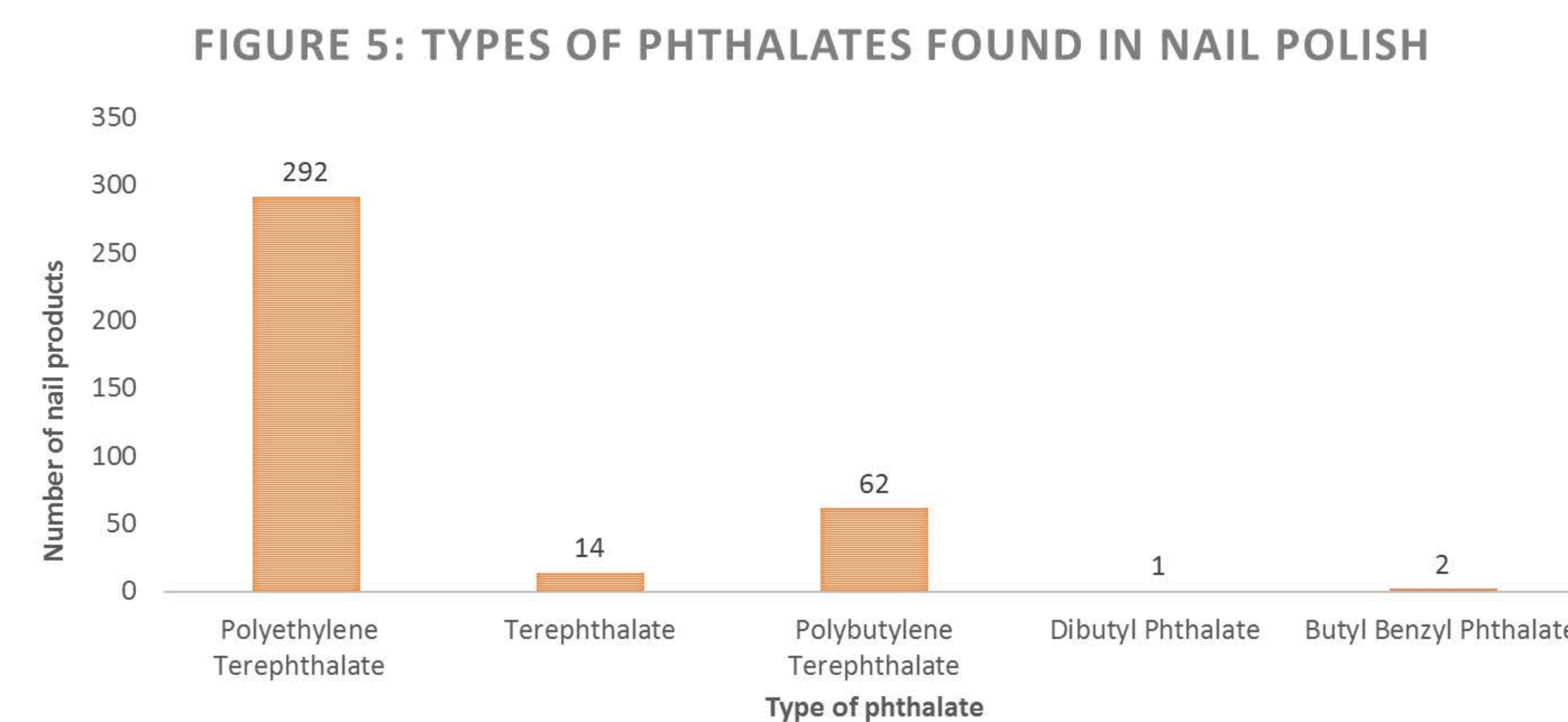
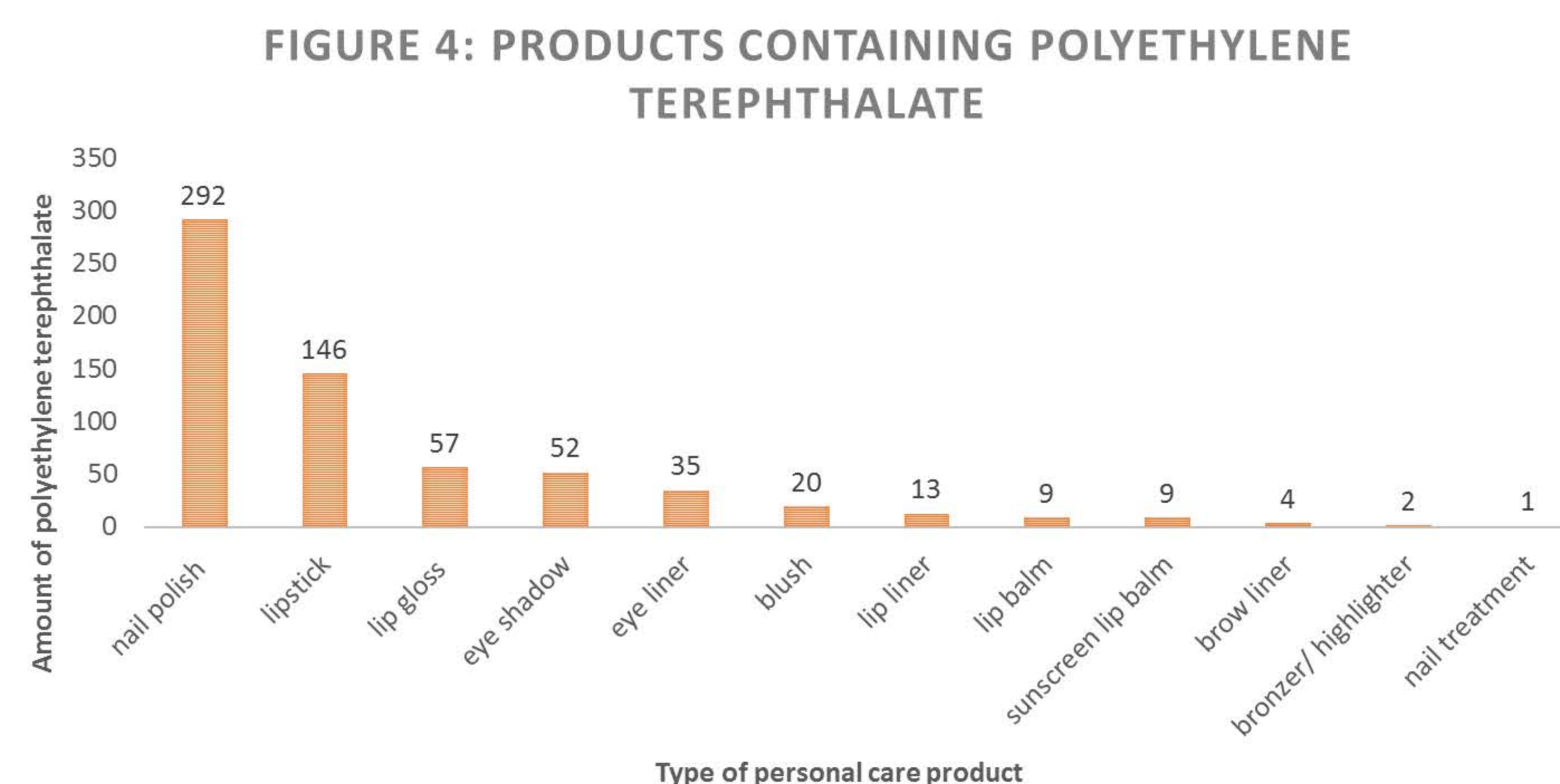
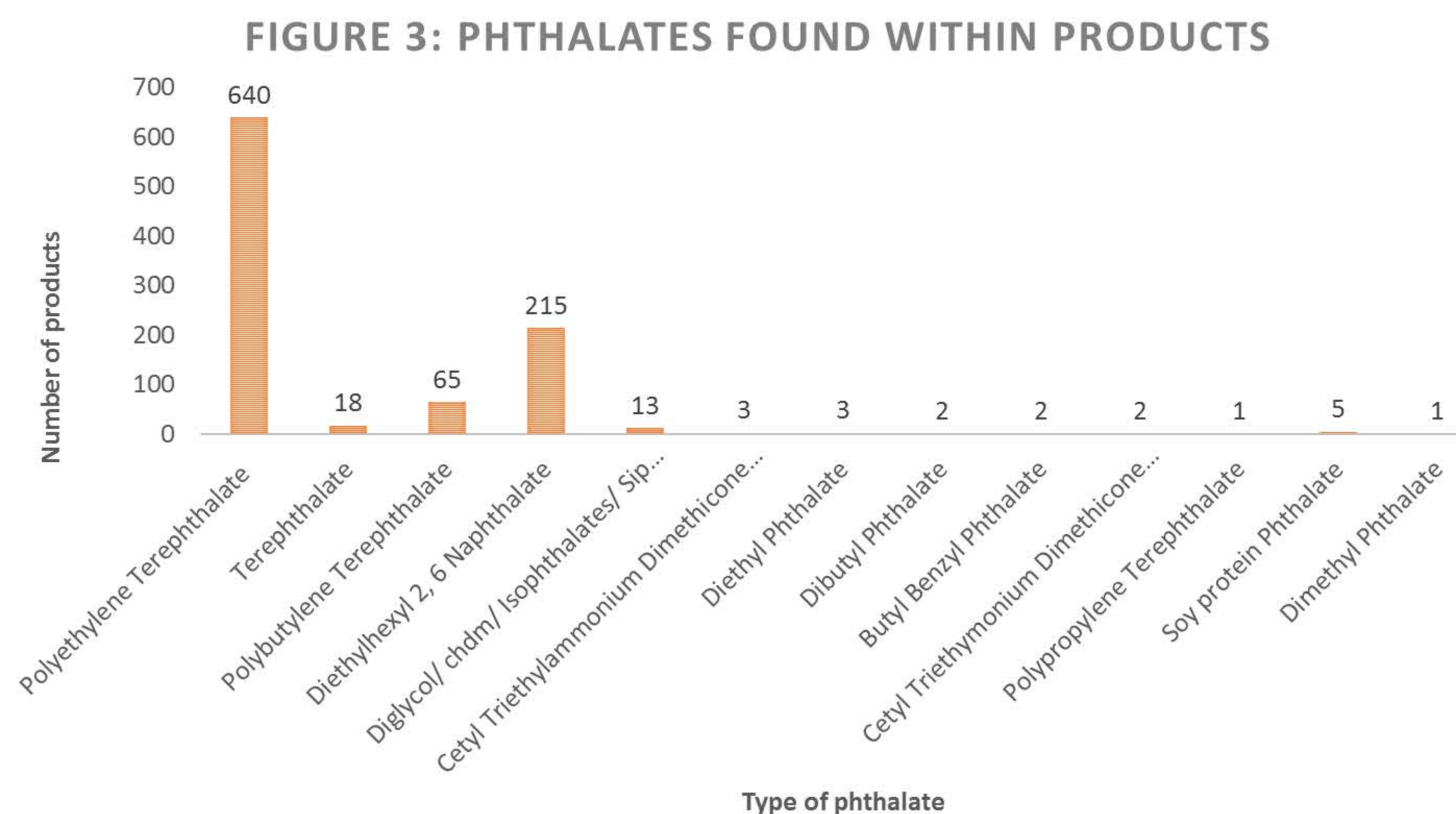


Figure 2: The chemical structure for polyethylene terephthalate

A previous study looked at associations between women who used personal care products within 24 hours before a urine sample was taken and the concentrations of phthalate metabolites in their urine. They reported results where the women that used personal care products, such as nail and lip products, containing phthalates had a 2.08 times higher ratio of metabolite concentration than women that did not use those products previous to the urine collection. This increase looked at monoethyl phthalate (MEP) which had the strongest association between personal care product usage and urinary concentration in this study (Parlett et al, 2012).

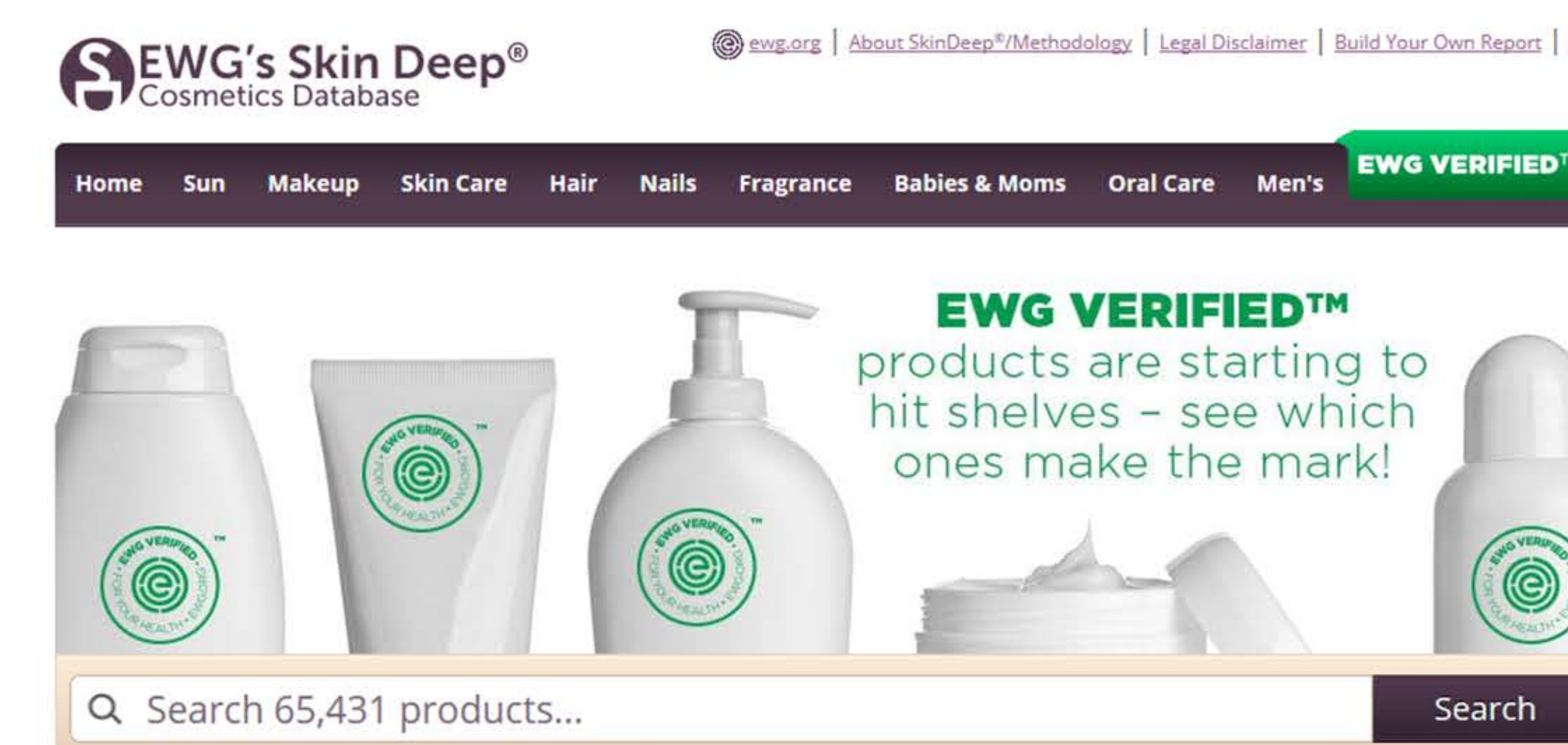
Our study was done to show how commonly phthalates are found in products that get used every day. This will allow us to narrow our focus in future work to the most abundant phthalates. In addition, the database, Skin Deep, will give information about the types of products where prevalence is high, helping to reduce the number of products to be examined in future exposure studies.

Results



Materials

The online database ewg.org/skindeep was used to collect data. This is The Environmental Working Group's Skin Deep cosmetic database. This resource features products and their ingredients and allows the public to search by either. This website is consistently being update and revised. The data was collected on February 20th, 2017. To narrow the search, the keyword "Phthalate" was entered into the search bar. The database then gave all the recorded products that contained phthalates of all types. This was then put into a spreadsheet, separating the products by type of phthalate, type of products and most commonly occurring phthalate.



Discussion

The most commonly found type of phthalate in personal care products was polyethylene terephthalate. This phthalate was found the most heavily in nail polish and lip products. In a previous study done on women's exposure to phthalates in relation to the use of personal care products, it was found that women had greater exposure to phthalates with nail products than they do lip products (Parlett et al, 2012). The amount of phthalate present per gram of creatinine in urine was measured. For monoethyl phthalate, when the urinary excretion was measured, women that used nail products had nearly double the concentration of MEP metabolites in comparison to women that did not use nail products. Nail polish gave 156.60 µg/g while lip products produced a level of 85.06 µg/g. This means that there was more MEP in women's urine due to the nail polishes than lip products (Parlett et al, 2012).

Our work found that polyethylene terephthalate was the most prevalent in personal care products, which this previous study did not examine. This is also not an expected result. The lip products would seem to be a greater source of exposure due to the mouth being a more direct route into the body than through the nail. This difference could be due to the amount of phthalate initially in the product or due to prolonged exposure with nail products. In the future, we plan to study the amount of phthalates in nail and lip products and how usage of these products can affect subsequent exposures. Based on these findings, our focus will be on the most prevalent type of phthalate that we identified, polyethylene terephthalate.

References

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