

***Interactive comment on* “Evaluation of Changes in Some Physico-Chemical Properties of Bottled Water Exposed to Sunlight in Bauchi, Nigeria” by Rose E. Daffi and Fwangmun B. Wamyil**

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Dear Referee, thank you for considering our paper publishable with minor corrections. Your comments on some aspects of the paper are well noted. A revised version will include edits on your areas of observation. Please find as follows our responses to your comments: a) Abstract Line 22-24 – I would suggest to leave out the recommendation since more information is needed (especially regarding characterization of the bottles, environmental conditions such as pressure, humidity: : :). Author Response: The recommendation has been removed from the Abstract. b) Introduction 1) General observation – Introduction is too long with irrelevant information in this case such

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as line 70-72 “Some chemicals called disinfection products (DBP) get in water as a result of disinfection (chlorination) in water treatment process. They include the trihalomethanes (THMs) and haloacetic acids (HAAs) which are the main DBPs worth noting (WHO, 2017).” Author’s Response: The intention of including the paragraph was to inform the readers about the different aspects of water treatment and possible effects of disinfectants on chemical composition of the water. However, the section has been removed and the introduction reviewed. 2) Sentences should be shorter and to the point. For example: “PET can be recycled by breaking it down into its constituents and using same to make new PET materials, unfortunately large amounts of this product still find its way to landfills, open dumps and improperly disposed waste where it breaks down to micro-plastics and nano-plastics ultimately finding its way to the marine ecosystem with deleterious environmental effects (PETRA, 2015; US EPA, 1995).” Author’s Response: Sentences have been modified. 3) Remove line 35 “Bottled water is a good option compared to other beverages especially those that contain high sugar content.” Author’s Response: Sentence has been removed. 4) What is the relevance of this paragraph on the topic: “The biological characteristics of water includes presence of pathogenic organisms-viruses, protozoa, helminths, bacteria which can cause illnesses such as typhoid, diarrhoea, tape worms, round worms. The presence of *Escherichia coli* (*E. coli*), *Enterobacter cloacae*, *Citrobacter freundii*, common in stool and sputum of warm-blooded animals including human proves the contamination of water by stool (Salvato et al., 2004; SON, 2007; Weiner and Matthews, 2003; WHO, 2017). Some of the organism however can grow in water distribution systems, reproduce as a result of warm temperatures and be inhaled as aerosols (*amoebae Naegleria fowleri* and *Acanthamoeba* spp.) (WHO, 2017). The target for most regulations is to ensure that no pathogenic organism is present in water (FDA, 2016; WHO, 2017).” Author’s Response: Though the paper focuses on physico-chemical changes in water and no biological test was carried out directly in the study, we believe that the paragraph will inform the readers about the biological aspects of drinking water quality worthy of note. But the paragraph has been removed for lack of relevance to the topic. 5) In the intro-

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duction it is mentioned: “Over the course of the year temperatures can rise to as high as 40oC around March-April in the study area. The study was carried out between December, 2019 to January, 2020 when average maximum temperature was 31oC. (World Weather Online, 2020)”. However, in the 2.2 paragraph it is mentioned: “December 2019 (Ambient: Max temp = 31oC, Avg. temp = 16oC and Min Temp = 16oC) and January 2020 (Ambient: Max temp = 31oC, Avg. temp = 24oC and Min temp = 14oC) (World Weather Online, 2020) using a destructive sampling technique.” Could you explain the difference in average temperatures? Was the temperature continuously monitored during 28 days? How could you explain these data being representative for temperatures of 40C while having experiments done during average of 16 and 24C?

Author’s Response: There was error in typing in the average temperature for December 2020 and it has been corrected accordingly. Secondly, for the water samples the temperature was not continuously measured for 28days, it was measured at the point of sample analysis. Though the study is not representative of temperatures of 40oC, but we believe it is still relevant in understanding the effect of exposing bottled water products to direct sunlight, which is all through the year.

c) Results and discussion

6) Different bottles either control samples or samples exposed to sunlight are showing changes to pH, antimony, BPA and nitrate concentrations. However, the explanation and link are missing to why is there a different decrease in for example pH. What is the structure of the bottles itself and what is the water matrix? What is affecting one sample to have pH decrease of 3.6 % while other 20%. Author’s Response: There was no study carried out on the structure of the bottles or water matrix to understand and discuss their effect on the pH levels. However, information we have show that for Sample A raw water is sourced from a spring while the other samples (B-E) are sourced from deep boreholes. Depending on the source, dissolution of minerals (for example limestone which tend to increase pH by dissolving carbonates, bicarbonate and hydroxide compounds; or dissolved carbon dioxide which will decrease the pH over time. The process of water treatment and the minerals added can also account for the change of pH in control samples. The discussion of pH results has been modified in the paper.

Thank you.

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