

Single-use nappies and their alternatives

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Introduction

This week saw the international launch of the “Single-use nappies and their alternatives” report from Life Cycle Assessments (LCAs) of the United Nations Environment Programme (UNEP) (UNEP et al., 2021). Guy Schanschieff, MBE, of the Nappy Alliance and Bambino Mio. and Claudia Giacovelli, Programme Officer, UNEP, hosted a webinar of presentations and a Q&A, attended by over 200 people world wide. (Giacovelli, 2021) The report consider 7 LCAs from researchers in the UK, (Aumonier et al., 2008; Aumonier & Collins, 2005); Australia (O’Brien et al., 2009) and Brazil (Hoffmann et al., 2020); studies on nappy design (J. M. F. Mendoza et al., 2019); nappy gluing systems (J. Mendoza et al., 2019), bioplastic nappies (Mirabella et al., 2013) nappies and one on recycling one-use nappies (Arena et al., 2016), but there are many limitations to the studies, described both by the researchers, the report on the research, and herewith. This paper seeks to summarise key information from the paper as well as to highlight some areas that might benefit from future investigation.

The Nappy Industry

Single-use or disposable nappies are part of a booming industry, expected to achieve over US\$71 billion worldwide by 2022, with some 33 billion single use nappies estimated to be consumed per year in the EU alone, creating around 6.7 million tonnes of waste annually (Cabrera & Garcia, 2019). Even where birth rates are dropping in more developed countries their aging populations are driving increasing use of adult incontinence products. Single-use nappies and adult pads are a substantial contributor to plastic waste globally, having environmental impacts and costs across their whole life cycle, particularly for those responsible for their disposal. Environmental impacts of one-use nappies include release of hazardous chemicals into the environment and waste management currently see them ending up in landfills or incinerators, or being discharged into the rivers and the sea (Cabrera & Garcia, 2019; Williams et al., 2019)

UNEP Report

The UNEP report (UNEP et al., 2021) seeks to inform policy makers about the environmental performance of washable and single use nappies, including a meta-analysis of seven comparative life cycle assessment studies from around the world, dating from 2005 to 2020. The report states that *reusable* nappies have a lower environmental impact than single-use nappies but there is the proviso that they must be laundered so as to minimise water use and in an energy efficient manner. For example, consumers can reduce their environmental impacts by washing below 60 degrees, line-drying nappies and reusing nappies as many times as possible, i.e. on more than one child.

A key difference between washable nappies and single-use nappies is *when* the highest impact is seen (Notten et al., 2021, pg 6) “Reusable nappies’ highest impact is in their laundering, whilst for single-use nappies the highest impact is in the “production of materials along with the management of the nappy at end-of-life.” Clearly any project to change to using washable nappies from disposable nappies needs to focus on the laundry process in order to minimise impact on the environment. Such a project could be expected to be parents and childcare providers therefore education in this area would seem to be a top priority.

Improving *single-use* nappies environmental impact relies on manufacturers achieving a lighter design and novel processes for recycling of used nappies, or perhaps composting them, which is something one would expect manufacturers and scientists to focus on. Also worthy of note is that the potty training age of children, for example in the US, when terry nappies were used, was around 18 months, whereas with modern one-use nappies the potty training age is around 2.5 years, or even a lot older, significantly increasing nappy use. The report assumes 2.5 years.

Executive summary of the UNEP Report

The executive summary recommends further detail, including the following for *washable nappies*:

- “Adequately educate consumers on efficient laundering practices (i.e. no palm oil detergents, tumble drying or high temperature washing)
- Incentivize “nappy service” business models and service companies that can wash reusables efficiently
- Encourage multiple reuses of nappies
- Focus efforts on transitioning to low-carbon electricity” (Notten et al., 2021, pg 6)

These recommendations are very useful for those informing and educating parents and early years care providers, but each will need interpreting for the local communities served in order to deliver improved impact. It may be that government might provide this guidance for delivery by local authorities, health services and childcare services.

And for *single use nappies* the recommendations are as follows:

- “Ensure adequate waste collection and appropriate disposal of single-use nappies
- Incentivise the design of nappies that are light-weight and require less materials
- Investigate the potential for bio-based/compostable nappies in tandem with the provision of infrastructure for their disposal (industrial composting or digestion)
- Invest in nappy recycling.” (Notten et al., 2021, pg 6)

These recommendations are aimed at nappy manufacturers, government/local authorities and waste contractors, in order to improve the infrastructure necessary to reduce the impact of single use nappies on the environment. Until the manufacturers of nappies take responsibility for the waste caused by their products, either financially or physically, it is hard to see how progress can be made.

Single use nappies produce 20 times more solid waste than reusable nappies as the faeces are not flushed but kept within the nappy, therefore causing more environmental risk, but on the other hand, flushing increases water consumption. (Khoo et al., 2019) Actually solid waste in nappies does not have to be flushed, it could be scooped or spooned directly onto other human waste, the same as adult waste is either flushed or deposited into the toilet/sewer/waste, depending on the provision in each location. However, there is no doubt that widespread practice currently is to wrap the solid waste inside the single use nappies, together with any wipes or gloves, and to put the whole package into the waste bin for disposal, ignoring the instructions on most packets, which is to put the solid waste into the toilet first.

Limitations of the study noted by authors of studies, and report as a whole:

The authors of the report state a limitation of the LCA studies is that no account has been taken of nappies being disposed of inappropriately, such as dumped nappies causing litter, or ending up in watercourses and adding to marine plastic pollution, therefore the end-of-life impacts of single-use nappies are certainly

under-represented. Whilst Hoffmann et al., (2020) described the composition of modern washable nappies and mentioned fabrics such as bamboo, hemp, cotton and their often polyester laminate (PUV) covers, no comparison of the different types of washable nappies was included and although these nappies are more part of the circular economy in that they are reused, there is little evidence of manufacturers consideration of what happens to their nappies at the end of their use.

The single use nappies were split into standard, glueless and bio-based, and evidence presented that a reduction in glue would improve sustainability, but that one of the most important strategies would be to reduce the environmental impacts of the raw materials used to make nappies, such as using alternatives that are more sustainable, and emphasizing how important effective post-consumer waste recycling and composting schemes would be. Meanwhile making life cycle data public would help designers continue to improve the sustainability of nappies (J. M. F. Mendoza et al., 2019) Mirabella et al., (2013) noted a further variety of limitations, such as discrepancies arising from land use models; variabilities due to locations and biotic resource impact assessment methods.

Further limitations of the study:

Some of the studies are out of date now, (Aumonier & Collins, 2005); (Aumonier et al., 2008) 2008 and 2009. The laundry machines and nappies used in those days would have been largely replaced by modern versions, lessening the validity of the report as a whole. The later study by Hoffmann et al., (2020) also found the impact from disposable nappies massively underestimated in the earlier Aumonier & Collins (2005) paper, which only allocated 15% of the overall impact of a nappy on its disposal and identified emission of only 550 kg CO₂ eq., whereas Hoffman allocated 75% and came up with 1236 kg CO₂ eq. for disposal in sanitary landfill, a massive difference, which geography (Brazil/Europe) does not sufficiently explain and therefore needs more investigation.

Although the Hoffman (2020) study identified that more detailed LCAs need to be done for laundry products, it only specified soap and synthetic laundry products, with no mention of eco eggs laundry nuts, laundry sheets, and similar, which could be included in order to provide more sustainable washing. There was also no mention of bio soaks of washable nappies before washing which reduce the need for higher temperature washes for shared nappies.

There was no mention of washable nappies used with and without disposable liners in any of the studies or the report.

Potty training often occurs beyond 2 1/5 years old where one-use nappies are used, increasing the volume of one-use nappies per child, which might be investigated further.

Availability of nappy services and commercial laundries, and incentivising the setting up of these businesses has not be considered, nor the use of drying cabinets as used in Scandinavia, rather than tumble driers used more internationally, but which increase the life expectancy of washable nappies significantly. Nor has plastic microwaste, caused by washing nappies made with plastics and the microparticles washing into the water course, been considered in this report.

As a day nursery care provider in the UK, what might one take from this new report?

Encourage colleagues and parents to use washable nappies, as the more sustainable option. Providing information on sustainable laundering, such as using low temperatures, efficient machines and renewable

energy, in order to reduce the use of water, energy and chemicals.

Ask for rental services for nappies to promote the circular economy.

Ask for information on how sustainable different designs and brands of nappies are, for proper labelling (Cordella et al., 2015) to include whether the nappies are made from renewable materials, and are part of the circular economy, (Colón et al., 2013; J. Mendoza et al., 2019; Reese et al., 2015) so that this information is available to consumers and professionals for their decision making. This will need manufacturers to be responsive or government intervention to force manufacturers to make this information available.

There is a potential business opportunity here based on experiences in other countries, and advice in this report, where day-care centres could manage a nappy service, laundering the nappies on site and renting nappies to parents on a monthly subscription or pay per service basis. A significant cost of a laundry service could be the energy used to transport the nappies between home and the laundry – unless this is done when collecting and dropping off children (not considered in the report)

Conclusion

The 2021 UNEP Report is a very welcome update on the impact of nappies, both washable and one-use nappies, providing useful insights into what manufacturers might do to reduce the impact of one-use nappies; and on what governments, local authorities might do for waste management, for promoting the uptake of washable nappies, and in supporting the circular economy for all nappies. Of particular relevance is the updated impact of the waste aspect of one-use nappies which was seriously understated in the earlier research of 2005 and 2008, resulting in flawed conclusions being made about one-use nappies which damaged the case for washable nappies. There is a further report due out on the impact of nappies, from the Department for Environment Food & Rural Affairs (DEFRA) whose publication was delayed from the spring until the autumn, to allow “time for peer review” according to a letter from Rebecca Pow MP, Parliamentary Under Secretary of State, but has still not been released to date.

The UNEP report does include information for parents and day care professionals particularly around laundry of washable nappies. But more research would be very useful to take account of areas not touched on in this report, such as those mentioned by the authors: discrepancies arising from land use models; variabilities due to locations and biotic resource impact assessment methods, as well other impacts such as the increasing age of children coming out of one-use nappies compared to washable nappies; the use of drying cabinets rather than tumble driers; using filters to minimise microplastic waste during the laundry process; a wider variety of laundry products and the use of disposable liners.

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