Science Project: Life cycle assessment of disposable and reusable nappies in the UK

Science Summary P1-481/SS

In recent years, there has been considerable debate over the relative environmental performance of reusable (cloth) and disposable nappies. While many people intuitively think that reusable nappies are better for the environment, disposable nappies account for some 95 per cent of the market and around 2.5 billion disposable nappies are sold in the UK each year.

The environmental impacts of different nappy types have been investigated in numerous studies. However, these studies have been limited in their accuracy or in their scope and have often been carried out by, or on behalf of, an organisation with a vested interest in the study results.

In 2001, the Environment Agency commissioned environmental consultancy Environmental Resources Management Limited (ERM) to provide an independent and objective environmental life cycle assessment (LCA) of nappy use in the UK. LCA is a technique used to assess environmental performance over the entire life cycle, from raw material extraction through to product manufacture, use and final disposal.

The study reported here complies with the latest methods laid down in international standards (ISO14040).

Study aims

The aim of the LCA study was to assess the life cycle environmental impacts associated with using disposable nappies and reusable nappies in the UK for 2001-2002. Three different nappy types were assessed:

- disposable nappies
- home laundered flat cloth nappies, and
- commercially laundered, pre-folded cloth nappies delivered to the home.

The systems studied

To compare the nappies fairly, the study considered the environmental impacts associated with an average child wearing nappies during the first 2.5 years of its life.

For each nappy type studied, all the materials, chemicals and energy consumed during nappy manufacture, use and disposal, and all the emissions to the environment were identified. All these 'flows' were quantified and traced back to the extraction of raw materials that were required to supply them. For example, polymer materials used in disposable nappies were linked to the impacts associated with crude oil extraction, and the flows associated with the fluff pulp used in disposables were traced back to paper and forest growth. For cloth nappies, the flows were traced back to cotton growth and production. All transport steps have been included.

The environmental impact categories assessed were those agreed by the project board: resource depletion; climate change; ozone depletion; human toxicity; acidification; fresh-water aquatic toxicity; terrestrial toxicity; photochemical oxidant formation (low level smog) and nutrification of fresh water (eutrophication). These impacts were calculated for an average nappy system in each case. The study therefore excluded impacts such as noise, biodiversity and the amount of land used by each system.

The total flows of each substance were compiled for each stage of the life cycle and used to assess the environmental impacts of each system. For example, flows of methane, carbon dioxide and other greenhouse gases were aggregated for each system in total. Internationally agreed equivalents that quantify the relative global warming effect of each gas were then used to assess the overall global warming impact of each nappy system.

For the three nappy systems, manufacturers provided data for their production processes. Commercial laundries also supplied data. Published excreta data were used for the contents of used nappies. Data on the numbers of different nappies in use and how they were washed etc. were estimated from surveys undertaken for the Environment Agency (1). Published life cycle inventory data were used to describe commodity material and energy inputs to the stages.

Sensitivity analyses were conducted for the following key areas of uncertainty:

- reusable nappy manufacture;
- aquatic toxicity impact method;
- drying methods for reusable nappies; and
- how excreta were disposed of.

Conclusions

For the three nappy systems studied, there was no significant difference between any of the environmental impacts – that is, overall no system clearly had a better or worse environmental performance, although the life cycle stages that are the main source for these impacts are different for each system.

The study was supported by a stakeholder group representing the interested parties and is the most comprehensive, independent study of its kind. It should be used as the basis for any further studies comparing the impacts of different types of disposable or reusable nappies.

The most significant environmental impacts for all three nappy systems were on resource depletion, acidification and global warming. For one child, over 2.5 years, these impacts are roughly comparable with driving a car between 1300-2200 miles.

An external expert appointed by the Environment Agency has critically reviewed the study. The review and how its findings were addressed are included in the full report.

(1) Environment Agency, 2004 *Time to change? A study of parental. habits in the use of disposable and reusable nappies*. Environment Agency.

This Summary relates to information from Science Project P1-481, reported in detail in the following output:

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Project Managers:
Terry Coleman and Joanna Marchant, Head Office

Research Contractor:
Environmental Resources Management
Easton House, Wallbrook Court
North Kinksey Lane
Oxford OX2 0QS
Tel: 01865 384 800

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Rio House
Waterside Drive
Aztec West
Almondsbury
Bristol
BS32 4UD

Tel: 01454 624400
Fax: 01454 624409

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