

# Consumer Choices

## The diaper dilemma

---

**The debate continues about cloth versus disposable diapers. Learn about your options and make wise consumer choices.**

---

With special designs for baby girls, boys, toddlers, and adults, single-use diapers have been widely adopted. They can be changed in a minute and fastened with tape. They save time for parents and care providers at child care centers, hospitals, and nursing homes and are thought to minimize the spread of germs.

### Diapers as waste

Single-use diapers have many critics. Some people view them as needless waste of paper and plastic. They are concerned about waste management and the need to conserve landfill space. Some people advocate a return to cloth diapers.

The debate about cloth versus disposable diapers is ongoing. Both cloth and single-use diapers use natural resources and have environmental costs. But, these costs are difficult to estimate accurately (12).

For disposable diapers, the major environmental impact is from waste disposal. The waste associated with disposables is easy to identify in the waste stream because families use a lot of diapers. Each child wearing disposables uses about seven diapers per day, according to *Consumer Reports* (5).

The main environmental impacts of cloth diapers are from energy and water use during laundering and drying. Each wash load uses about 15 gallons of water that must be heated and treated as waste water after washing. These costs vary with the water supply and power costs.

The manufacturing of both cloth and disposable diapers has environmental impacts on water and air quality. Several major studies of the impact of diapers on the environment have been conducted in recent years (7, 8, 9, 11).

A highly publicized study by Carl Lehrburger estimated that 18 billion paper and plastic diapers were put in landfills in 1988 and concluded that disposable diapers account for 2 percent of total municipal solid waste and 3.5 to 4.5 percent of household waste by weight (8). The Lehrburger reports suggested that disposable diapers may cause health risks at landfills because of the untreated feces and urine they contain. His reports advocate using cloth diapers (8, 9). The National Association of Diaper Services sponsored the studies.

Other major studies concluded that cloth diapers were no better for the environment than disposables (2, 7, 11). These studies were sponsored by the paper industry and disposable diaper manufacturers. Other studies have shown there to be no health risk from disposable diapers at landfill sites.

Most life cycle or cradle-to-grave waste analysis studies are based on computer models with various numbers estimated or based on assumptions. Differences in the assumptions affected the conclusions reached.

Estimates or assumptions were made about how many diaper changes were needed during the day, the number of cloth and/or disposable diapers used per change, the wear life of the cloth diapers, the frequency of laundering, the cost of laundering and/or disposal, and the amount of energy required during manufacture, use, and disposal (2).

### Deciding on diapers

Although many families are concerned about waste disposal issues, they also value their time. Today there are many one-parent or dual-career families and cloth diaper care takes time. None of the life cycle analysis studies did a very good job of estimating the cost of additional time that families might spend in diaper care if they switched to cloth. Learning more about diaper options may help you choose for your family.

---

**Table 1. Washing cloth diapers**

---

Follow these suggestions to maintain white diapers:

1. To remove solid waste, rinse diapers in toilet bowl.
  2. Collect soiled diapers in pail. Use cold water soak with detergent, borax, or 2 tablespoons of liquid chlorine bleach per gallon of water to control odor.
  3. Launder diapers daily or often enough to control odor.
  4. Pour diapers and soak solution into washer and spin.
  5. Next, use detergent with presoak cycle and spin. Liquid or phosphate-based detergents or soaps can be used. Carbonate-based detergents may cause diapers to feel stiff and harsh; fabric softeners do not remove this stiffness.
  6. Wash in hot water with detergent and dilute chlorine bleach to sanitize and kill germs.
  7. Bleach only once or twice a week to prolong wear.
  8. Rinse thoroughly.
  9. Fabric softeners reduce absorbency if used too often.
  10. Use regular dryer setting or line dry.
- 

### About disposable diapers

Disposable diapers are made with a polypropylene liner and a polyethylene backing (plastics), but manufacturers say that they are 85 percent biodegradable because most of the product is cellulose. The primary component inside the absorbent layers is paper-like fluff derived from wood pulp (13).

Super-absorbent diapers contain cross-linked sodium polyacrylate, a powder that turns to a gel in contact with urine or any liquid. Although this material was associated with toxic shock syndrome with ultra-absorbent feminine hygiene tampons, no such link has been found for diapers (5). Health authorities say the biggest health risk with disposable diapers is that changes will not be frequent enough to prevent diaper rash. Because super-absorbent diapers do not leak as quickly as other disposable diapers, awareness of the need for a change is reduced. Super-absorbent diapers are superior in promoting skin dryness (4). Proctor & Gamble cites studies from medical journals that show disposable diapers are superior to cloth in maintaining normal skin pH and keeping babies' skin dry (6). Also, disposable diapers have been found to leak less than cloth diapers, reducing the spread of germs.

Authorities agree that feces from disposables should be emptied into the toilet, but landfill studies have proved that it seldom is done. However, it has not been shown conclusively that diaper wastes are a significant health hazard at landfills (10).

### About cloth diapers

Cloth diapers are available in flat, prefolded, or form-fitted styles in cotton gauze or birds eye weave. Some new styles have waterproof covers attached. Flat diapers are faster to dry in home laundering, but folding takes time.

A recent study at Iowa State University investigated 20 families' willingness to accept form-fitted cloth diapers. Most families in the study previously had used disposable diapers, but liked the design of the form-fitted cloth diapers and used them with a child under two years of age for 12 weeks.

Families were able to maintain the multi-layered, nylon-covered cotton diapers so that they were sanitary and free of microbial contamination after home laundering and drying. Laboratory tests showed that the form-fitted diapers were durable through 150 launderings, but their absorbency gradually declined and leakage increased with the number of machine washings and dryings (1).

Cloth diapers require careful laundering (see table 1), and many families don't own or have access to laundering equipment at home. Families may have difficulty finding transportation and child care in order to use public laundry facilities. Few commercial diaper services exist in Iowa. Furthermore, most child care centers require disposables. The problem is not limited to families with infants, as many incontinent adults also depend on disposable diapers. As the proportion of elderly in the population grows, this segment of users is likely to increase.

Babies and incontinent adults can be dry and their skin healthy using either disposable or cloth diapers. Diaper rash is associated with excess skin wetness (4). With disposables, the diaper lining wicks moisture away from the skin. But with careful attention to the need for changing and hygiene, either cloth or disposable diapers are satisfactory from the health standpoint. Alkaline soaps and diaper wipes that contain alcohol can dry the skin and must be used with care. Zinc oxide ointment can help control diaper rash, but if rash lasts more than three or four days, consult a doctor.

### Consumer costs

Many families assume cloth diapers cost less to use. It is difficult to accurately compare out-of-pocket costs of using cloth versus disposable diapers. Families have their own ideas of

how often babies need changing, how many diapers can be washed in one laundry load, and the number and sizes of disposables that might be used. It's easy to figure the cost of using the laundromat, but it's not so easy to figure the cost of doing laundry at home because you have to allow for cost and depreciation of laundering equipment, electricity to heat the water and run the dryer, and so on.

The following estimates, as shown in tables 2 and 3, may help you compare the costs of disposable and cloth diapers for the time period that most infants require diapering. You might find different totals if the diapering period is longer or shorter, if diaper changes are more or less frequent, or if you consider other factors. Based on the assumption that the child will need diapering for 30 months, these estimates show costs assuming use of either 5.4 or 7 diapers per day. They also assume four loads of wash per week.

### Cost of form-fitted cloth diapers

Form-fitted cloth diapers cost more to buy than regular flat diapers and may range as high as \$10 to \$12 each. A day's supply of at least seven form-fitted diapers costs more than two dozen flat cloth diapers and needed covers. (See table 2 for those estimated costs.) The cost of laundering is no different than regular cloth diapers, but with some form-fitted diapers chlorine bleach cannot be used, therefore more staining occurs. Some brands may advocate using special deodorizers that add to maintenance costs. Also, the multi-layered construction does not allow quick drying. The additional dryer time adds to the utility bill. Nevertheless, you may think that the convenience of these form-fitted cloth diapers and the satisfaction associated with using cloth may balance out the money costs involved.

### Diaper services

If you believe cloth diapers are better for the environment, but can't afford the time to take care of diapers yourself, a diaper service may be an option. However, few diaper service businesses exist in Iowa. One diaper service in central Iowa charges \$50 per month for delivery of clean diapers and pickup of soiled ones twice per week. Extra charges are added if diapers are not set out for pickup according to schedule or more than a set number of larger size diapers are needed. Diaper service usually costs families more than disposables or home laundering of cloth diapers.

**Table 2. Cost estimates for cloth diapering and laundering**

<b>Estimated cost of reusable supplies</b>	
Cost of 2 dozen new flat cloth diapers	\$32.00
Diaper wraps (2 waterproof covers)	16.00
Waterproof plastic pants (6 pairs)	14.00
Diaper pail (for soaking diapers)	9.98
<b>Total</b>	<b>\$71.98</b>

#### Home laundering

**Average cost per month = \$33.44<sup>1</sup>**

**Estimated cost of one load = \$1.94<sup>2</sup>**

- One \$1.94 load/day X 4 days X 4 weeks X 30 months = \$931.20
- \$931.20 + \$71.98 = \$1,003.18
- \$1,003.18 ÷ 30 months = \$33.44 per month

#### Public laundering

**Average cost per month = \$34.40<sup>3</sup>**

**Estimated cost of one load = \$2.00<sup>4</sup>**

- One \$2.00 load/day X 4 days X 4 weeks X 30 months = \$960.00
- \$960.00 + \$71.98 = \$1,031.98
- \$1,031.98 ÷ 30 months = \$34.40

<sup>1</sup>Cost includes detergent and supplies.

<sup>2</sup>This estimate was obtained using the Consumer Price Index to update the cost of doing laundry as estimated by the USDA in 1981, assuming four loads of wash per week (3). It includes the costs of the washer and dryer depreciated over 11 years, the cost of detergent and additives such as bleach, electricity, and other costs associated with equipment ownership.

<sup>3</sup>Cost does not include detergent, other supplies, and transportation.

<sup>4</sup>This estimate assumes it costs \$1.00 per wash load with \$1.00 for 40 minutes drying time. This does not include detergent, bleach, etc.

**Table 3. Estimated consumer cost of disposables**

**Average cost per month = \$33.41<sup>1</sup>**  
**= \$43.32<sup>2</sup>**

Costs of disposable diapers differ depending on the diaper size and the number in the package. This cost estimates here represent an average of several brands from a few popular discount and grocery stores in Ames, Iowa, in February 1994. The variance in price per diaper within a size was very small among stores for national brands. Store brands tended to be a few cents less. The number of weeks a child might require a particular size will vary, so this is just an arbitrary example.

<b>Changes per day =</b>	<b>5.4</b>	<b>7</b>
Birth to 3 months of age:		
12 weeks, size small @ 14¢	\$63.50	\$82.32
... to 9 months of age:		
24 weeks, size medium @ 18¢	163.30	211.68
... to 21 months of age:		
48 weeks, size large @ 21¢	381.02	493.32
... to 30 months of age:		
36 weeks, size extra-large @ 29¢	394.63	511.56
For 30 months (2½ years):		
<b>Total</b>	<b>\$1,002.45</b>	<b>\$1,298.88</b>

<sup>1</sup>Assumes 5.4 changes per day.

<sup>2</sup>Assumes 7 changes per day.

---

## References

1. Brackelsberg, P.; Stone, J.; and Murano, E. (May 1993). *Parents' Experiences with Form-fitted Cloth Diapers*. Unpublished report to donors.
2. Crossen, Cynthia. (May 17, 1994). "How 'Tactical Research' Muddied Diaper Debate." *Wall Street Journal*, pp. B1, B8.
3. Courtless, J.C. (Winter 1982). "Cost of Doing Laundry." *Family Economics Review*, pp. 17-22.
4. Dallas, J.J. and Wilson, P.A. (October 16, 1989). *Diaper Performance: Maintenance of Healthy Skin*. Proceedings of the annual meeting of the Association of College Professors of Textiles and Clothing, Atlantic City, Georgia.
5. (August 1987). "Disposable Diapers." *Consumer Reports*, pp. 510-512.
6. *Facts about Disposable Diapers*. (1992). The Procter & Gamble Co., One Procter & Gamble Plaza, Cincinnati, Ohio 54202-3315.
7. Franklin Associates, LTD. (May 1992). *Energy and Environmental Profile Analysis of Children's Single Use and Cloth Diapers*. Revised report.
8. Lehrburger, C. (December 1988). *Diapers in the Waste Stream: A Review of Waste Management and Public Policy Issues*. P.O. Box 580, Sheffield, Mass. 01257.
9. Lehrburger, C.; Mullen, J.; and Jones, C. V. (January 1991). *Diapers: Environmental Impacts and Life Cycle Analysis*. Report to the National Association of Diaper Services, Philadelphia, Pennsylvania.
10. Lyman, F. (January/February 1990). "Diaper Hype." *Garbage: The Practical Journal for the Environment*, Vol. 2 (No. 1) pp. 36-40.
11. Newton, A. C.; Franklin Associates. (July 1990). *Disposable Diapers: Summary and Interpretation of Literature Sources on the Environmental and Health Effects of Diapers*. Report for The Diaper Manufacturers Group of the American Paper Institute.
12. Pavlicek, T.K. (May 1990). "The Bottom Line." *Iowa Conservationist*, Vol. 29 (No. 5) pp. 3-7.
13. Stewart, T.S. (June 20, 1989). *Two Solid Waste Initiatives for Disposable Diapers*. The Procter & Gamble Co., Paper Products Division, news release. Received through private correspondence.
14. Wirka J. and Tyrens, J. (June 1989). *Positive Steps Toward Waste Reduction: Focus on Disposable Diapers*. Solid Waste Alternatives Project of Environmental Action Foundation and the National Center for Policy Alternatives' State Support Center on Environmental Hazards, 2000 Florida Ave. N.W. #400, Washington, D.C.

---

File: Textiles and clothing 11



Printed on Recycled Paper

The National Association of Diaper Services provides information to those who want to start diaper services, including information about the standards for accreditation of the service. For information about starting a diaper service, contact the National Association of Diaper Services, 2017 Walnut Street, Philadelphia, Pa. 19103; (215) 569-3650. The association's information concedes that it takes a population base of approximately 300,000 people to support a diaper service. The association's packet explaining how to start a diaper service costs \$100.

## Policy alternatives for the future

As families consider their choices, many environmental leaders still promote returning to cloth diapers. They fight an uphill battle as it is estimated that nine out of 10 parents use disposables (6). The rush toward legislation regarding diapers as a waste management strategy was generally halted by 1994 because of conflicting findings of various studies about the environmental impact of diapers (2). Nevertheless, the concern about environmental conservation remains.

## Innovations in diapering

Single-use diaper innovations include the introduction of pull-up styles of training pants, the modification of diaper design to reduce bulk, and changes in packaging to reduce waste. Recycled plastics are being used for packaging.

Cloth diaper innovations include the introduction of multi-layered, form-fitting styles with attached or separate waterproof covers in various sizes. Family Clubhouse, Nikky, and Biobottoms offer home mail-order consumers a variety of form-fitting cloth diapers, waterproof covers, and training pants. These designs eliminate the time needed for folding diapers, the need for pins, and make cloth diapers fit more like disposables. Market

No endorsement of companies or their products mentioned in this publication is intended, nor is criticism implied of similar companies or their products not mentioned.

Prepared by Janis Stone, professor and extension specialist, textiles and clothing, and Laura Sternweis, extension communication specialist. Reviewed by Phyllis Brackelsberg, associate professor, textiles and clothing.

### ... and justice for all

The Iowa Cooperative Extension Service's programs and policies are consistent with pertinent federal and state laws and regulations on nondiscrimination regarding race, color, national origin, religion, sex, age, and disability.

realities have led other cloth diaper manufacturers, such as Dimples, to withdraw from the direct consumer market and focus on institutional users.

## Future options

Families who participated in the Iowa State University form-fitted cloth diaper study were willing to change their way of living if they felt there was environmental benefit. However, most of these families had full-time stay-at-home family members. The families with two parents working outside the home found the care of cloth diapers more troublesome.

During the 12-week wear study, the majority of the families involved did not change their opinions that environmental preservation is very important and that they were willing to spend more time to improve the environment. However, their uncertainty increased as to whether or not disposable diaper manufacturing was a problem with regard to maintaining the natural environment (1). Also, six months later, just half the families whose children were still in diapers continued using the form-fitted cloth diapers.

Research related to composting and solid waste management is ongoing, but Procter & Gamble points out that municipal solid waste composting is available to only 1 percent of the U.S. population. Diapers are not suitable for backyard composting (6).

Communities with waste-to-energy incinerators provide the opportunity to recycle disposables into energy by burning them.

There is no clear answer to the diaper dilemma related to environmental conservation, according to various life cycle analysis studies related to solid waste management. Families must continue to study the options and make their own choices about the best way to diaper their babies and care for each other.

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Robert M. Anderson, Jr., director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.