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Global laundering practices

Alternatives to machine washing

KEYWORDS: laundry; consumer practices; washing machine; hand washing; dry cleaning; clothing; wool

ABSTRACT

This article discusses laundering practices around the world including alternative methods such as washing by hand, airing, steaming, and dry-cleaning. These methods, which have received little attention in research, are often more suited to products made of wool, silk or other materials able to be cleaned using gentler techniques than more commonly used fibers such as cotton and synthetics. The material is based on extensive literature review from the past 20 years and reanalysis of previously unpublished survey data. The results show that washing by hand is common and that is the main laundering method in most rural areas of developing countries, but also significant for smaller portion of laundry in developed countries. Dry cleaning is less common, and mainly used for specific clothing items. Simple method such as airing can reduce the washing frequency, and thus reduce the environmental impacts resulting from the cleaning of clothes.

INTRODUCTION

Laundering practices have been studied before from different perspectives, such as gender equality, hygiene and their environmental contribution. However, most of these studies focus only on machine washing (1), while other cleaning methods have received little attention. Alternative methods of clothing care include techniques such as washing by hand, dry-cleaning, airing, steaming, ironing, and stain removal. These maintenance practices are common in many places and their environmental footprint differs from machine washing. This article studies which clothes cleaning methods are in use, their distribution globally, reasons for choosing them, and variations between different clothing items. Their environmental implications are also shortly discussed.

METHOD

This article is based on an extensive literature review on consumers' laundering practices (2) and previously unpublished data based on reanalyses on existing survey datasets collected by Consumption Research Norway (SIFO), a non-profit research institute, and the Nielsen Company, a marketing research company present in more than 100 countries. The scope of the literature review is global and includes the past 20 years.

The Nielsen Company (3) conducted a global wardrobe audit for Australian Wool Innovation Ltd (AWI) in 2012. They studied consumers' wardrobe composition and asked questions about each of the clothing items owned by the respondent, including cleaning methods and the frequency of wear and washing. The study consisted of an online survey of 467 adult respondents across seven countries: Australia (n= 56), China (n= 104), Italy (n= 51), Japan (n= 52), South Korea (n= 52), UK (n= 52), and USA (n= 100) (3). The online interviews lasted on average 90 minutes. The gender distribution of respondents was equal. The men in the study owned on average 114 clothing items, where the Chinese had least (69 items) and the Americans most (124 items). The women owned more clothes than men, on average 131 items. The British women had most (155) and the Chinese least (90) items.

Additional qualitative data was collected through face-to-face in-home interviews in October 2011 (4). Between four and eight informants were interviewed in large cities of the same countries that were included in the survey, resulting in total forty interviews. These interviews were based on a semi-structured discussion guide and lasted about 1.5 hours.

Laitala, Klepp & et al. (5-8) have studied laundering practices in Norway. Quantitative information on consumers' experiences, habits and opinions concerning clothing maintenance was collected through three surveys in Norway in 2002 (N=1008), 2010 (N=546) and 2011 (N=1124). Additional qualitative data was collected through interviews of 16 households, and technical data based on laundering experiments. These data are reanalyzed in order to find more information of alternative clothes cleaning methods.

RESULTS

Extent of use of various cleaning methods

According to the Nielsen Home Care survey that was conducted in 61 countries (9), use of washing machines dominates, but in some regions, washing by hand is also common (Figure 1). Majority of households in developed countries own a washing machine (Table 1). In addition, many households especially in Africa and Middle-East report to have access to laundrettes or shared washing machines, but also that they have clothes washed by hired help (10).



Figure 1 Self-reported laundering methods in different continents based on surveys in 61 countries (9) (The data from Africa includes only Egypt, Morocco and South Africa)

Table 1 Ownership rate of washing machines as percentage of households in different countries (2)

<40%	41-70%	>71%
Armenia	Brazil	Austria
Kenya	Bulgaria	Lithuania
India	China- <i>rural regions</i>	Luxembourg
Indonesia	Croatia	Malaysia
Myanmar	Czech Republic	Malta
Nigeria	Latvia	Netherlands
Philippines	Mexico	North America
Vietnam	Romania	Norway
	Slovakia	Portugal
	Turkey	Poland
	Thailand	Slovenia
		South Korea
		Spain
		Sweden
		Switzerland
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Table 2 shows that there are differences also within Europe on how laundry is done (11, 12). A combination of washing by hand and using a washing machine is most commonly used in Eastern and Southern Europe, while Scandinavians and Western Europeans are more likely to use only a washing machine. When looking at European households that do not own a washing machine, Greeks are most likely to wash their laundry by hand (85% of households that do not own a washing machine), while only 5% of the Dutch and 2% of the Norwegians report a similar practice. Use of public laundries is more common in these countries (13).

Table 2 Results from survey question “How do you usually take care of the laundry?” in Europe (11, 12)

	Usually using washing machine when doing laundry	Using a combination of both – washing machine and washing by hand
Europe total	79%	16%
Western Europe	83%	12%
Eastern Europe	75%	20%
Southern Europe	75%	22%
UK /Ireland	81%	15%
Scandinavia	84%	10%

The Nielsen Company’s global survey in seven countries asked respondents how each of the clothing items they own were washed. Results show that there are differences between men’s and women’s laundering practices (Figure 2). In all included countries, women are more likely to hand wash clothing than men are, while men own more clothing that is dry-cleaned. China stands out with higher frequency of hand wash.

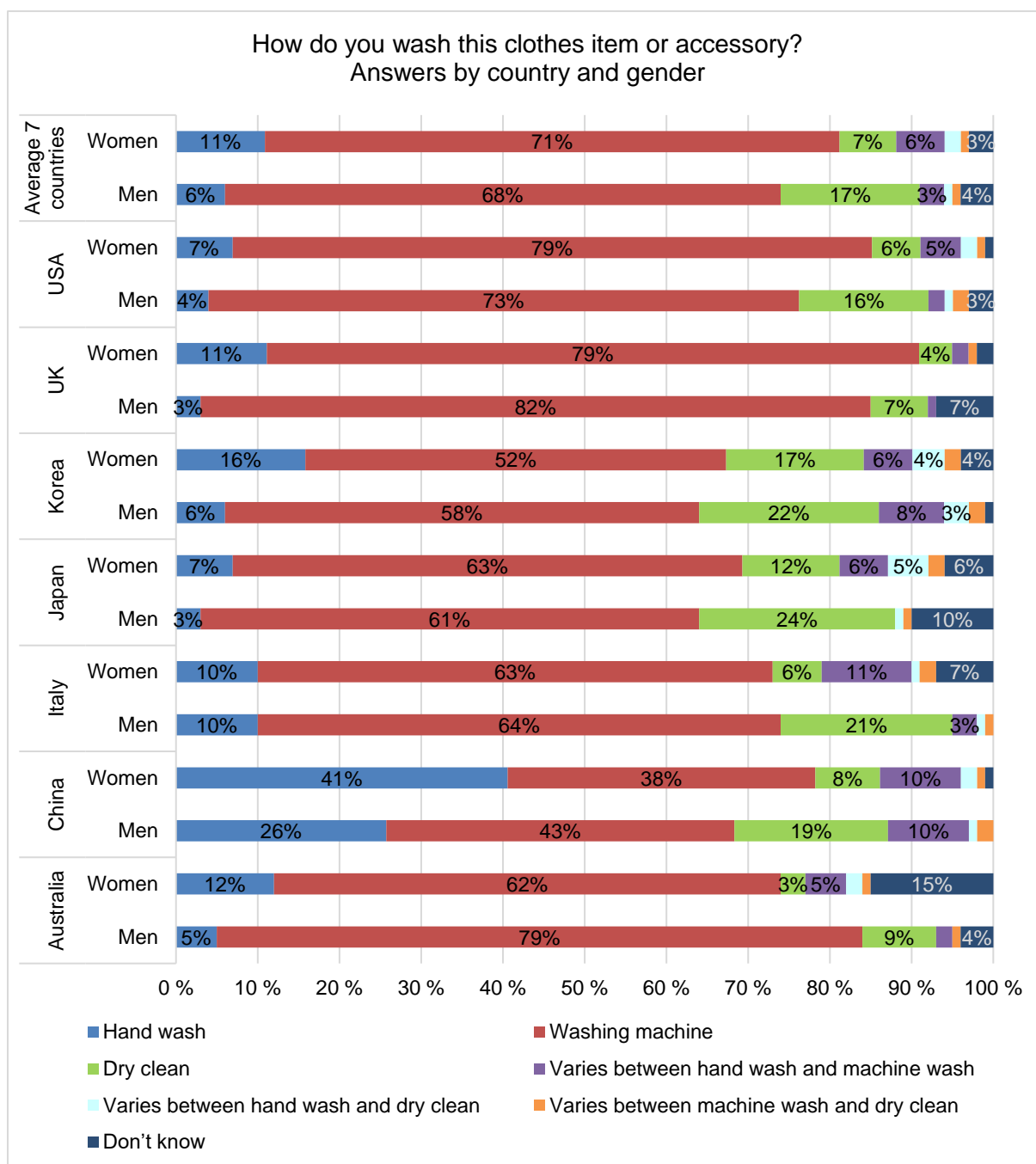


Figure 2 Most common washing methods in seven countries by gender (3)

Hand washing

Many households report to use mixed washing method that combines washing in machine with washing by hand. In Mexico, about 55% of households that own a washing machine use mixed methods, where some clothes are soaked, pre-treated or scrubbed before washing in a machine, and inspected after wash to see if additional measures are needed, thus ending up in a modified personalised cleaning process (14). In Brazil, 51% of respondents used washing machine only, while 11% hand washed only and 38% used a combination of both (15).

In some areas use of combined methods is mainly based on considerations of saving water or energy, such as in Kenya where, even in homes with washing machine, up to 75% of the clothes are washed by hand. This is mainly due to water scarcity, but also because the consumers believe that washing machines cannot do heavy-duty work such as cleaning the collars and cuffs of shirts (10).

A survey of urban households in China showed even though 97% of these respondents owned a washing machine, 90% answered that they also washed laundry by hand (16, 17). The main reason was superior cleaning performance as the respondents did not think it was hygienic to wash items such as underwear or socks in the machine (18). Many also reported having only a small amount of laundry to be washed at any time, and saving water and electricity, as well as less damage to clothes (16, 17). The main reasons for washing in a machine was that heavy/large loads are difficult to wash by hand, and that sometimes they were too busy or tired. Bedclothes and outerwear were most commonly washed in machine, followed by trousers (16, 17). There are regional variations in laundering frequencies based on climate. In hot and humid countries such as India, laundry is usually not collected but rather washed as soon as it is dirty (19). This causes more frequent laundering with smaller laundry loads.

Few studies document hand washing in detail, but in China it was estimated that the average time used on hand washing was rather short, 12% used less than 15 minutes, 63% used 15-30 min, and 25% used 30-60 minutes (18). 90% of informants pre-soaked the laundry with dissolved detergent between 5 and 30 minutes (16, 17). All of the respondents used a two-handed scrubbing technique to wash the laundry, but in addition, about one in five used a washboard, and about one in ten used brushing. A Finnish study showed that women washed textiles by hand a couple of times a month, and men once every two months (20). A survey of young Swedes showed that only 55.9% of them sometimes washed by hand, and it was more common among women than men (21). Ecolabelling Denmark (22) estimates that hand washing frequency in the UK and Germany is on average 0.3 washes per week, France 0.2 washes, Spain 0.8 washes, and significantly higher in Italy, 1.6 washes. These constitute, on average, 7% of total laundering instances.

Garment types and their cleaning methods

The results from The Nielsen Company's global survey by garment type are given in Figure 3 (3). It shows that the great majority of t-shirts, briefs and socks are washed in washing machines. The most common products to be dry-cleaned are suits, overcoats, coats, jackets and blazers and especially for men's formal clothing that often contains wool (Figure 3).

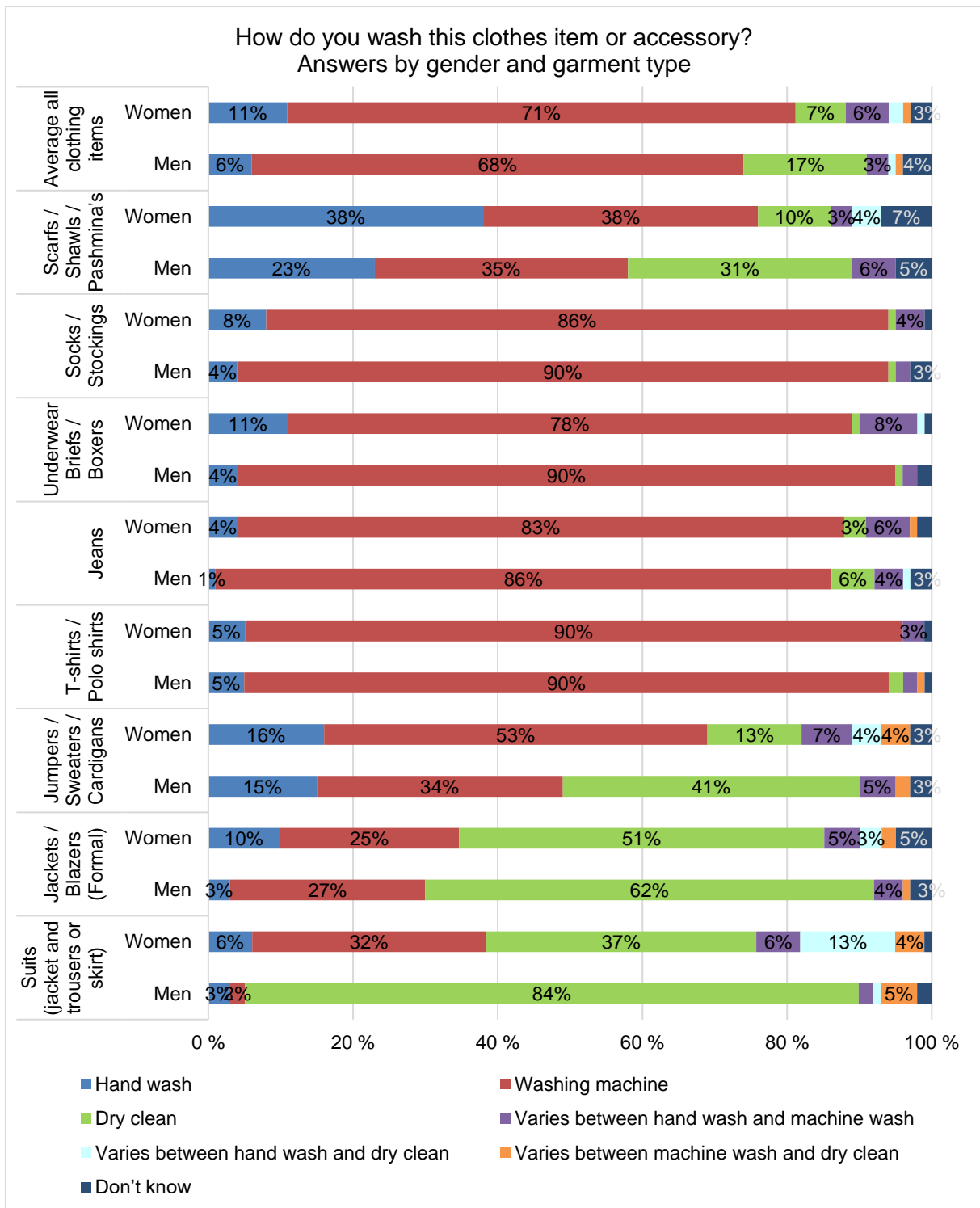


Figure 3 Most common washing methods for various types of clothing items (3).

The same survey results sorted by fiber content show that woollen garments are more likely to be dry-cleaned than those of cotton or synthetic material (Table 3).. Almost half of men's woollen clothing is dry cleaned, while only one quarter of women's woollen garments are commonly dry-cleaned, with hand washing more likely than for men's clothing.

Table 3 Main washing methods for clothing made of different materials based on a survey in seven countries (3).

	Washing method
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Fiber content	Hand wash		Machine wash		Dry clean	
	Men	Women	Men	Women	Men	Women
Cotton and cotton blends	6%	10%	82%	79%	9%	4%
Wool and wool blends	7%	15%	33%	37%	47%	25%
Synthetic and man-made materials	8%	11%	70%	73%	12%	6%

Table 4 shows the main rules of thumb on how the informants from the seven countries chose the cleaning methods for their garments. The interviews showed that there were great cultural differences in how wool is perceived and taken care of (4). In the US, many believe that woollen garments have to be dry-cleaned, and often regretted if they had hand washed the items instead. They would choose to wear the woollen garments less in order to avoid the inconvenience and costs of dry-cleaning. They often also believed that the garments needed to be cleaned after one wear. Woollen socks were an exception to the dry-cleaning rule, as they were usually hand washed with wool detergent. Consumers in Japan and Australia report that they may only dry clean a garment at the end of the cold season. In the UK, the consumers did not see the same need to dry clean woollen garments and thought they could be washed instead.

Table 4 «Rules of thumb» for selection of cleaning methods (4).

Method	Fabric	Garment category
Machine wash	Cotton, synthetics	Casual social wear, home wear, underwear
Hand wash	Wool, silk	Underwear (some), knitwear (some), smart casual (some)
Dry clean	Cashmere, wool	Coats, down jackets, suits, work attire (jackets, pants, skirts), knitwear (some)

Alternative cleaning methods such as airing and steaming are not studied much. Interviews in Norway and Sweden have shown that consumers use steam in cleaning, either by using steam cleaner apparatus or by hanging garments in rooms with steam, such as bathroom during or after a hot shower (8). The informants described this process was used to replace washing, dry-cleaning and/or ironing, but we do not know the prevalence of this practise among consumers.

In Norway, it is more common to wash woollen products in the washing machine (70%) than by hand (19%) (6). Airing has traditionally been a central method in keeping woollen products clean, combined with stain removal and brushing. Airing is still used, and it is more commonly used for woollen products than for other textiles (Figure 4) (6). Respondents over the age of 40 are slightly more likely to air woollen textiles than younger respondents (6). A Dutch consumer survey showed 26% of households said they aired textiles often, and these households washed on average 90 cycles less per year than the households that never or sometimes aired (23). This confirms that airing is likely to reduce laundering frequency and reduce the environmental impacts of wool laundry.

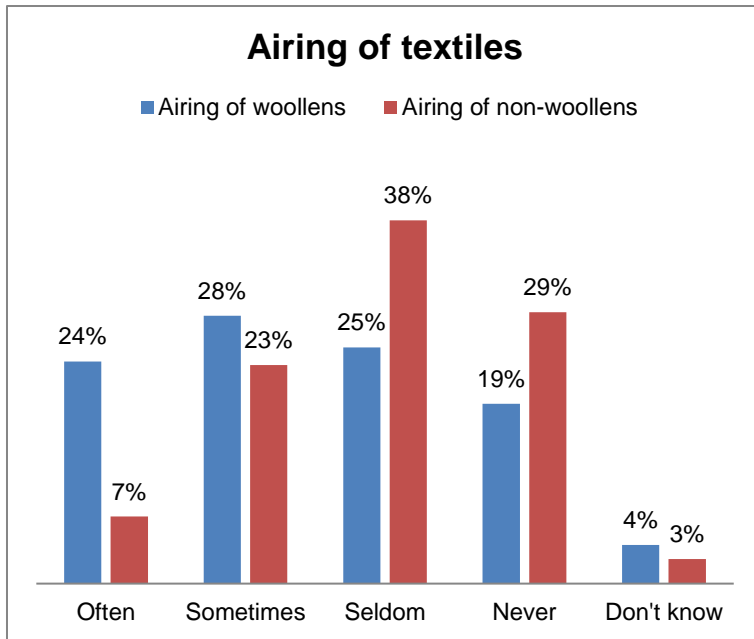


Figure 4 Airing of woollen and non-woollen textiles in Norway (N=268) (6)

DISCUSSION

The main cleaning methods and their use areas are summarised in Table 5. These methods cause varying degrees of environmental impacts. The energy consumption of hand washing is dependent on whether heated water or other energy consuming aids are used. More is known about energy consumption of machine washing. The portion of horizontal axis drum machines (front loading) is increasing in USA, Asia and Australia, and they dominate domestic use in Europe. They have been demonstrated to use 38% less water and 58% less energy than the standard top-loading vertical-axis models (24), although these figures vary greatly between the various machine types and selected washing cycles and laundering temperature. In addition to environmental and health hazards associated with the use of PERC, dry-cleaning uses a lot of energy, about 0.586 kWh/kg textiles (25). In contrast, regular laundering in Europe requires only about 0.15 - 0.20 kWh/kg, approximately a third of that for dry-cleaning (1, 26).

Additional energy is required for drying laundry. In USA, it is estimated that about 70-80% of laundry is dried in a dryer (24, 27, 28). In Europe, the ownership rate of clothing dryers is lower, and thus a smaller portion of laundry is tumble-dried. Laundry washed by hand is most likely hang dried.

Table 5 Summary of the main laundering methods by region

Cleaning method	Region	Types of garments
Washing machines with horizontal axis drum (front loading)	Europe, 23% of USA, increasingly in Asia and Australia	Main laundry
Washing machines with vertical axis drum (top loading)	Most of USA, Asia, Australia (decreasing)	Main laundry
Hand wash	Global, main method in rural areas of developing countries	Main laundry in developing countries, some delicates in developed countries (about 5-7% of laundry)
Dry-cleaning	Developed countries, used more often in the USA than many other countries	Suits, coats, some delicates

Estimating the water use in washing is not as straight forward, due in part to variation in the quality of water used. In South Africa, washing at riverbanks is common especially during summer (29). In addition, reuse of water is

common. In Mexico, the rinse solution was reused in 30% of cases, and wash solution 9% of times. Wash solution was reused twice on average (14). In Japan, use of grey water (reused bath water) in laundering is common (30). It was estimated that washing by hand in China consumes about 23 litres per laundry load of about 1 kg (16, 17), which is slightly more than reported values for machine laundering in Europe (11-20 l/kg) but less than machine laundering in USA (46-52 l/kg) (1, 2, 26).

The environmental impacts of cleaning clothes vary greatly between regions and depend not only on access to efficient technological products such as washing machines but on cultural factors and individual laundry behaviour (31). The lack of wastewater treatment can cause water pollution, such as eutrophication caused by detergents. High consumption of water is less problematic in areas where there is a plentiful supply of clean freshwater, although periodic water scarcity and drought is an increasingly frequent and widespread phenomenon.

CONCLUSIONS

We have shown that laundering practices vary greatly between regions and for different garment types, and are dependent on available technologies and local infrastructure. More is known about consumer practices related to laundering in washing machines than the other cleaning methods. However washing by hand is common in many continents, and surveys show that woollen garments, delicates and formal wear are more likely to be washed by hand or dry-cleaned than other garments, but the practices vary between countries. The reasons for using alternative methods differ. One obvious reason is the lack of access to washing machine and other infrastructure. Other reasons include consumers' wish to save energy or water, take better care of clothing, and their practice of frequent laundering with small amounts of laundry. However, also low trust to the machines' cleaning capability or suitability to wash wool play a role. Thus, we found hygienic, economic, practical and cultural reasons for choosing different cleaning methods.

There is also lack of knowledge of the environmental contribution of the alternative cleaning methods. A lot of work has been conducted on improving washing machines so that they save energy and water during use. We found that a simple method such as airing can reduce the washing frequency, and thus reduce the environmental impacts of clothes cleaning. Therefore, promoting the methods that have the smallest environmental footprint are likely to have great potential in reducing the total environmental impacts of clothing consumption. The collation of data on global laundry practices in this article is also an important contribution to improving the quality of estimates of the environmental impacts of consumer use phase of clothing to inform policy and ethical consumption.

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