The Sustainability of Fashion
What Role can Consumers play?
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Introduction

The textiles industry is one of the largest industries in the world. Its supply-chain includes agriculture, manufacturing, processing, fabric care, use, recycling and disposal. Nearly all countries are involved in the textile industry though the actual involvement can vary from textile and product design and development of manufacturing technologies, to actual production and shipping to numerous locations. However all countries face the growing problem of textile waste management directly linked to unsustainable textile production and use.

Being among the most polluting industries, textile industry has to explore ways of becoming sustainable to minimize resource use and pollution, improve the safety of workers, eliminate sexual abuse, and ensure the right of consumers to make an informed choice. The future of sustainable textile largely depends on its ability to reduce the use of resources, such as land, water and oil, ensure reuse and recycle of products to minimize waste. In addition, there are other aspects of sustainability that textile industry should focus on, including protection of the environment and human health, occupational safety, gender equity and women’s empowerment, as well as meeting the demand of consumers for eco-friendly textile products.

This paper touches upon non-sustainable character of textile industry with the aim to suggest recommendations to address associated environmental, health and social problems and make consumers a driving force able to shape the future of sustainable textile. It includes data of a Global Health & Environment Synthetic and Cotton Fibers Survey conducted by students at McMaster University as part of their research project on consumer knowledge surrounding synthetics and cotton in the textile industry. The survey is an attempt to explore some of the global cultural beliefs and social understandings of fast fashion, cotton and synthetic garments and environmental impacts. It concludes that textile industry has a tremendous impact on the global environment, health and human rights which requires governments, private sector and consumers to put in greater efforts to make it truly sustainable.

Dirty secrets of textile industry

Environmental consequences

The impact of the textiles industry on our Planet is huge and it involves the whole product life cycle from the raw material supply, textile manufacture, shipping, retail and disposal at the end of life. This includes the use of pesticides in cotton farming[1], intensive water and energy use during the production of textile, the application of toxic chemicals in dyeing, as well as waste management.

Not everyone is aware that 2,700 liters of water are needed to produce a single cotton t-shirt and 1,800 gallons of water are used to produce a single pair of jeans.
Manufacturing of synthetic fiber requires less water, though dyeing both cotton and synthetic fabric requires 1.3 trillion gallons of water each year[2].

In addition dyeing processes usually involve more than 1600 different chemicals, including formaldehyde, chlorine, lead, and mercury. Treatment and dyeing of textile is accountable for 20% of global industrial water pollution. The effluent from textile industries carries a large number of dyes and other additives which are added during the colouring process[3]. Water in rivers and other water sources in countries with developed textile industry, such as China, Bangladesh, the Philippines, Ecuador, Brazil is contaminated with numerous harmful chemicals which are difficult to remove in conventional water treatment procedures. Contaminated wastewaters are discharged into our surface and groundwater, while the color of the water discloses the colors in fashion. Dyes and additives may also undergo degradation to form products that are highly toxic and carcinogenic[4]. In fact, the textile industry is the #1 industrial polluter of fresh water on the planet.

Besides water contamination with toxic chemicals, textiles are one of the main sources of microplastics in the world’s rivers and oceans that match synthetic fibers, including polyester, acrylic, polypropylene, polyethylene, and polyamide fibres, used in clothing. More microfibres is detected in densely populated areas that have sewage outfalls contaminated by fibers from washing clothes, noting that around 1,900 individual fibers can be rinsed off a single synthetic garment. According to a 2017 IUCN report, 35% of all microplastics in the oceans come from the laundry of synthetic textiles, making it the first source of microplastics before car tyres. [5]

Unsafe working conditions

Environmental pollution is not the only threat that textile industry is accountable for. There are serious negative social consequences associated with textile industry where 80% of the world’s garment workers are women. Cases of gender discrimination, sexual harassment and abuse have been detected in all countries where clothes are produced. Women of child bearing age are at a particular risk of developing breast cancer after the menopause due to their exposure to man-made fibres, as well as miscarriages or birth defects linked to long hours of work, shifts requiring standing instead of sitting or exposure to toxic chemicals[6][7]. Suppliers to big chains fail to ensure safe working conditions for factory employees putting workers health at risk[8].

Besides unsafe working conditions, garment workers are paid well below the amount required for a decent standard of living[9]. According to the new research by Deloitte Access Economics New research by Deloitte Access Economics for Oxfam Australia reveals that living wages are higher than estimated garment factory wages in Bangladesh (76%), India (41%), Indonesia (29%), and Vietnam (8%). The report states that on average only between 2% and 4% of the price of a piece of clothing sold in Australia goes toward workers’ wages in factories.
Health impacts
Sad picture of the environmental and social consequences of textile production, use and disposal will not be complete if the health impacts are not considered. For example the major safety and health issues in the textile industry include exposure to cotton dust[10]. According to the literature review, as early as the 1950’s doctors knew that inhaling cotton dust cause breathing problems in mill workers[11]. It is now well understood that cotton dust contains toxin producing bacteria and that long-term exposure often results in chronic wheezing and other severe, and at times fatal respiratory problems[12]. After years of research, byssinosis or brown lung disease was found in many mill workers. Fortunately, committed efforts by the Amalgamated Clothing and Textile Workers Union (ACTWU) and the Brown Lung Association (BLA) resulted in the 1978 cotton dust standard[13]. However, this is one type of exposure and only in the U.S. Many developing countries do not have the regulatory or labour union capacities to mitigate health risks. Many suffer from acute or short-term health effects of cotton manufacturing including chest tightness, coughing, wheezing, phlegm, weakness fever, chills and breathing difficulty (Silpasuwan et al., 2016)[14].

Wearing synthetic clothing is one more important health hazard directly linked to fashion industry. Reproduction disorders, allergies, skin irritation, respiratory problems is an incomplete list of diseases associated with toxic chemicals that may be found in synthetic clothes, including formaldehyde, brominated flame retardants, perfluorinated chemicals. Formaldehyde[15], for example, can be found in fabrics that are labeled as:
- Anti-cling, anti-static, anti-shrink
- Waterproof
- Perspiration-proof
- Moth-proof and mildew resistant
- Chlorine resistant.

Because clothing comes into prolonged contact with skin, toxic chemicals may be absorbed through the skin, especially when the human body is warm and skin pores have opened to permit perspiration (Mirghani et al., 2008)[16]. Once absorbed by humans, toxic chemicals tend to accumulate in the liver, kidney, bones, heart, and brain. The effects on health can be significant when high levels of accumulation are reached. The effect is particularly serious in children because chemicals in toxic dyes may negatively affect their growth and development (Mirghani et al. 2008)[17].

Organic cotton as the way out of toxic textile

The adverse environmental, health and social outcomes of textile industry highlighted above make the production and use of both cotton and synthetic fibres highly unsustainable. That includes the use of non-renewable resources, consumption of huge amounts of water and energy, the leakage of chemicals and plastics into ecosystem, dangerous working conditions, loss land and decreased varieties of crops due to cotton production, serious health effects from inhaling cotton dust, exposure to
toxic chemicals during textile production and dyeing as well as health impacts of wearing synthetic clothing.

As a reaction to the growing concerns regarding the environmental and health effects of the textile industry, the production of organic cotton started to grow. This development has benefited from increasing market demand for organic cotton fiber, with several large textile brands and retailers expanding their sales of organic garments (Ton, 2004). The production of certified organic cotton fiber is estimated at 31,000 tons for 2006, with retails of organic cotton products reaching a turnover of 583 million US$ (Klein, 2006). Furthermore, achieving the Sustainable Development Goal (SDG) 3; to ensure healthy lives and to promote well-being for all ages requires practices in organic cotton. The SDGs support the organic cotton movement in relation to cotton farmers not being exposed to toxic chemicals, as well as the increased value of crop rotation for crop variety (AOC, 2018).[18] Crop variety helps to meet nutritional needs through growing food crops such as grains, legumes, vegetables and fruits.

What makes organic farming different from conventional cotton farming, are the methods and standards for growing (See pic. 1). To be organic, a cotton field needs to be pesticide and herbicide free for at least three years and the crop must not be from a genetically modified strain. By using manure instead of synthetic fertilizers, biological pest controls instead of pesticides, avoiding fuel-based fossils during farming, and more efficient weeding strategies, organic cotton can be cultivated (Textile Exchange, 2010).[19] Crop rotation is often also used to rest the land between plantings, and to restore fertility to the soil (Goldbach, Seuring & Back, 2003). Compared to non-organic cotton, organic cotton cultivation produces much less adverse impacts on the environment. During the production of organic cotton, soil fertility is maintained through the expansion of biologically diverse agriculture (Gaite, 2009). The application of toxic and harmful pesticides and fertilizers are prohibited; genetically engineered seeds are also impermissible in the production process. The demand for organic cotton is dependent on the attitude of brands and manufacturers who recognize their responsibility in preserving the environment.
Is synthetic fiber becoming a global leader in clothing industry?

Despite clear evidences that organic cotton can play a crucial role in moving towards sustainable textile, cotton is no longer the number one fiber in textile industry. Rather, synthetics are taking the lead globally due to their affordability while cotton industry faces many challenges in terms of competition with polyester[20]. For example, the USA imports their polyester at half the cost of cotton from China. Moreover, man-made fibers are flexible, an essential new feature of contemporary clothes. Additionally, synthetic fibres are wrinkle and moisture resistant, strong, durable, which is in the interest of athletes and travelers, needs little or no ironing[21]. With the life cycle of synthetics, combined with the use of various toxic chemicals and their negative health and environmental effects, it is clear that reassessment is required.

Nevertheless the past five decades have seen an immense shift from natural fibers to synthetic materials. The main reason for this shift constitutes from the fact that synthetics are cheaper and easier to produce in large quantities, ideal for the rise of fast fashion when new clothing items are quickly and cheaply produced to provide consumers with a constantly changing revolving-door of new fashions[22].

### Pic. 1 Organic cotton versus Conventional cotton

<table>
<thead>
<tr>
<th>Conventional Cotton Farming</th>
<th>Organic Cotton Farming</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Typically treats seeds with fungicide or insecticides</td>
<td>• Uses untreated seeds</td>
</tr>
<tr>
<td>• Uses GMO seeds for majority of cotton</td>
<td>• GMO seeds not allowed</td>
</tr>
<tr>
<td>• Applies synthetic fertilizers</td>
<td>• Builds soil organic matter through crop rotation, intercropping and compost</td>
</tr>
<tr>
<td>• Causes loss of soil due to the predominantly mono-cropping culture</td>
<td>• Retains water more efficiently due to organic matter in soil</td>
</tr>
<tr>
<td>• Relies on irrigation (blue water)</td>
<td></td>
</tr>
<tr>
<td>• Applies herbicide to soil to inhibit weed germination</td>
<td>• Controls seeds through cultivation and physical removal</td>
</tr>
<tr>
<td>• Sprays herbicide to kill the weeds that do grow</td>
<td></td>
</tr>
<tr>
<td>• Uses insecticide to control pests</td>
<td>• Maintains balance between pests and their natural predators through healthy soil</td>
</tr>
<tr>
<td>• The 9 most common are highly toxic; 5 are probable carcinogens</td>
<td>• Uses beneficial insects, biological and cultural practices to control pests</td>
</tr>
<tr>
<td>• Crop dusting may cause harm to surrounding eco-systems and communities</td>
<td>• May use trap crops to lure insects away</td>
</tr>
<tr>
<td>• May defoliate with chemicals</td>
<td>• Defoliates through natural seasonal freezing</td>
</tr>
<tr>
<td></td>
<td>• May stimulate defoliation through water management</td>
</tr>
</tbody>
</table>
is a key driver of fast fashion since the continuous release of new products motivates customers to keep up with ever-changing trends[23].

However, as depicted in this paper, many known and unknown health and environmental impacts are related to the use of synthetics. The sustainability of synthetic fashion is in question though some ideas are presented in Table 1.

Ways to increase the sustainability of fashion
In early 2018 a group of graduate students at McMaster University developed a questionnaire and conducted surveys to get an understanding of the consumer perspective of the future and sustainability of textile industry. Detailed description of the survey results is presented in Annex 1, 2 which identifies multiple pathways that one may choose to increase the sustainability of both cotton and synthetic based fashions. Here are some recommendations to move towards sustainability in textile industry which were developed based on the results of the survey.

Raise awareness
First, one must focus on increasing consumers’ awareness of consumerism and the associated health risk. Consumers play a key role in the sustainability of the fashion industry, even though they are often not aware of this. For consumers to make informed decisions regarding their clothing, they must be aware of the issue at hand. Awareness involves not only having the information, but also ensuring it is easily understood and accessible by all. Adopting an environmentally friendly laundry regime is an example of how better knowledge could change people’s habits; washing full-loads, using the correct washing-cycle, switching to an energy-efficient washing machine, washing in cold water, drying clothes on a line, and using biodegradable detergents all add to sustainability. For more information see Pic 2.
Using this knowledge: what can you do as a consumer?

Check the labels – buy ethical clothing (do your research)
Labels tell us a lot about where the clothing comes from, and what is in it! If you choose to buy organic cotton, check for certification. Some manufacturers have also been making a move towards sustainable eco-fashion, with a low impact on the environment throughout the garment life-cycle; and companies are taking notice. Wal-Mart, for example, has been selling organic cotton women’s T-shirt since 2004 (Cloudio, 2007). Companies like Patagonia are participating in eco-fashion by using postconsumer plastic bottles into clothing. A little research online will tell us a lot more about eco-fashion – and turn the tide of fast fashion to a slow one!

Buy second-hand – because vintage is in!
Fast fashion means buying a lot more clothes; and having more clothes means a lot of waste. According to the Environmental Protection Act, the average American throws away 68 pounds of clothing and textiles annually (Cloudio, 2007). Buying second hand and reusing clothing is a great way to reduce waste, reduce the impact on the environment – and to save some money. Demand for fast fashion is what fuels the industry; the less we buy, the less we put the stress on the global supply chain … and it does not hurt that 90s fashion is in again!

Shop less, shop local
While buying locally exclusively would have a negative impact on the life-sustaining production chain of cotton in various parts of the world, it may help change the way the global clothing chain functions. According to author Pietra Rivoli, about 1 billion garments purchased in America are made in China (Cloudio, 2007). If we buy part of our clothing locally, it will help reduce the carbon footprints of clothing travelling all the way here. Research suggests women buy seven times more than men, and women’s clothing supply and waste reflects that. Despite massive donations to the second hand market, about 85 per cent of unwanted textiles in North America end up in landfills — which amounts to more than 11 billion kilograms a year.[24]

Other natural fabric: Hemp and Bamboo
Worried about the human and environmental impacts of the garment industry? Choose sustainably grown cotton, hemp, bamboo which uses less pesticides and is better for the environment. Other eco-friendly materials include Ingeo which is made out of fermented corn-by product, and has been used by well-known clothing designers (Cloudio, 2007)

Wash less
Did you know that most of the energy use in the life cycle of cotton happens post-purchase? Also the laundry of synthetic textiles represents 35% of all microplastics in oceans.[25] Try to wash less and whenever possible, air dry your clothes on a sunny day. It's more vitamin for your clothes - and better for the planet.
Redical Rethinking
Radical rethinking requires changing the mentality of both consumers and the industry. As such, after the issue has been defined and understood by all, a desire and urge for change is needed, where the quality of clothing available to consumers is valued and accessible over the quantity, where profits are not longer of the utmost importance, but rather the health of the environment and citizens worldwide. Radical rethinking includes, inter alia changes that can also be made in the number of clothes people buy and the number of times these are worn before thrown away. However, these habits are strongly related to the fast fashion addiction and require changes in the entire industry[26] [27].

Increase corporate and consumer responsibility
Intergenerational Responsibility: stakeholders must act with the past, present, and future in mind. Global governance must implement policy solutions that recognize the socio-cultural role of fast fashion and promote corporate social responsibility by incentivizing companies to adopt sustainable textile production. Moreover, policies must also hold industries accountable. Government policies must also incentivize consumers to purchase more sustainable clothing through educating consumers and providing subsidies to make sustainable clothing alternatives affordable.

Push for alternatives
Alternative, sustainable materials exist in the clothing industry and have a lesser impact on consumer health and the environment. The push for other options should be both on the production and consumption side of the life cycle so that it impacts both consumers and the industry.

Introducing effective policy
"STOPLIGHT" LABELLING: The current method of labeling clothing requires significant adjustments to ensure that it is easy to understand and use. Based on the composition of the article of clothing (and its associated risk), a colour will be placed on the label.

| RED: This article of clothing is not safe nor sustainable as it is made primarily of synthetic materials. High Risk. |
| YELLOW: This article of clothing is not ideal for safety not for sustainability as it contains synthetic materials. Medium Risk. |
| GREEN: This article of clothing is ideal for safety and sustainability as it contains no synthetic materials. Low Risk. |

QR CODE: Stoplight labelling is intentionally simplistic so that it is easily understood by all. However, for those who wish to access a detailed report about their article must be able to easily access the information. Thus, a QR code must also be placed on the label. Thus, by scanning the QR code, all relevant information will be in the palm of the consumer's hand.
The second option, related to more sustainable material choices, is the usage of recycled synthetics. Recycled polyester, for example, provides a green, sustainable alternative for virgin polyester [28]. By using PET as the raw material, it reduces plastic waste and decreases dependence on petrolatum, thus, creating less pollution. Furthermore, no agricultural land is required, no animals get hurt and it does not require gallons of water for production. Moreover, the recycling process can continue to use old fibers as raw material. Econyl is another sustainable example of recycled nylon plastic waste[29]. However, these recycled materials are still a form of synthetic fibres and therefore pose serious health concerns to consumers.

Completely switching over to natural fibres might present the most sustainable pathway for environment and health. Cotton, wool, silk, linen, leather and hemp are all examples of natural fibers with their own advantages and disadvantages. In general, they are a sustainable resource as they are renewable, biodegradable and carbon-neutral. Moreover, natural materials seem to have a significantly less damaging impact on human health, for example, a reduction in allergies and rashes. However, opting for the organic production of these materials is essential, since traditional processes use significant quantities of chemicals and pesticides. The problem with many of these materials is that they use a lot of water to produce (cotton uses one thousand times as much as polyester), may harm animals (silk and leather), or are less readily available and more expensive. These natural fibres could provide a sustainable option in the future, but developments must be made in improving the characteristics of natural materials and the increase in production and availability.

Annex 1

Analysis of the consumer perspective on the future of cotton textile
To get an understanding of the consumer perspective on the future of cotton textile, 10 consumers were consulted, 8 of whom consider themselves to be environmentally conscious. The age range was 15 to 47, with 9 females and one male. Semi-structured interviews were conducted, including questions covering shopping behavior, knowledge regarding the environmental, health, and human rights concerns of the cotton industry, and where they got their information from.

What did they find important?
- Organic is seen as a better option for health/ fair trade but often associated with higher costs. Alternative materials are not readily available
- More challenging to be eco-friendly when it comes to children’s clothing as they grow out of it fast
- For some shoppers, environmental and human rights impact alone does not shifts their consumer behavior
- Style and brand-name (designer) can be at odds with choosing certain material
• Many consumers hold companies/industries accountable - profitability appears to trump ecological well-being/human rights

What did they know?
• Fast fashion is related to garment industry but not necessarily to cotton per se; although some people are aware of cotton’s impact on human rights/environment
• Environment
• Environmental impact is less visible: 60% of interviewees identified environmental concerns in the cotton industry. Conscious shoppers are more aware of environmental impact of cotton industry while others are less aware/unaware
• Human rights
• “Sweatshops”: 100% of interviewees referred to “sweatshop” like conditions in the garment factories, while 30% were aware of human rights concerns in the cotton production/farming
• Historical and current connection of cotton production to “slavery”

Human health:
• Aware of health effects for farmers and factory workers (inhalation of dust/chemicals, working circumstances in factories)
• Less knowledge about effect on consumer: environmentally conscious people did have suggestions, but most of them couldn’t mention clear effects for the consumers
• Quote: ‘I don’t know what kind of health impacts can be there if you just wear it’
• People appeared to associate negative health impact with synthetic fibre and not cotton
• Some conscious shoppers did speculate health effects from dyes and potential toxins such as pesticides while others did not think of health impacts

What is unknown?
• Need to have more awareness around the impact of non-organic cotton on various aspects of our lives (environment, health, human rights)
• Most interviewees felt that knowing direct health impacts would impact consumer behaviour; this is needed to shift the demand to lessen the supply of non-organic cotton

Analysis of the consumer perspective on the future of synthetic textile
As an indication of the consumer’s knowledge surrounding synthetics in the textile industry, a 10 question survey was distributed. This survey is an attempt to explore some of the global cultural beliefs and social understandings of fast fashion, synthetic garments and environmental impacts.

Approximately 166 people from 15 countries responded to the survey and completed the questionnaire. Respondents reside in the following countries: Luxembourg, Netherlands, United States of America, Poland, Sweden, Norway, Austria, New Zealand, Canada, Ireland, Pakistan, Indonesia, South Korea, and Australia. However, a majority of respondents were from Canada and the Kingdom of the Netherlands. To begin,
respondents were provided with a description of the purpose of the survey and a definition for synthetic fibres. Respondents were also made aware that they would remain anonymous and that they may quit the survey at any point in time.

The survey consisted of the following questions:

- What is your gender? Potential answers: Man, woman, other, prefer not to specify.
- What is your age and occupation?
- What is your country of residence?
- Do you check the labels on your clothing? (Where it is made, what it is made of, etc.) Potential answers: Always, Never, Sometimes
- Are you aware of any adverse health impacts caused by synthetic fibres in clothing? Potential answers: No, Yes (Please Specify)
- How interested are you in better understanding the sustainability of the clothing you buy? (0-5, 0 being not at all, 3 being neutral, 5 being very interested)
- What information would you like to be provided with when you purchase your clothing? Potential answers: Country of production, chemical content (materials used), means of disposal (recycling, etc.), environmental impacts, associated health impacts (for consumers...A.K.A YOU), who made the article/their working conditions, none of the above and other (please specify).
- How would you prefer to be provided with information about your clothing? Check all that apply. Potential answers: the label, in stores (through signs), store websites, television (campaigns, documentaries, commercials, etc.), none of the above, I do not care, other (please specify).
- Do you think that there are better alternative clothing materials? (E.g., cotton, hemp, silk, etc.) Please consider this in terms of human and environmental impact. If your answer is yes, please specify which alternative you believe is the best. Potential answers: No, not sure, yes (please specify/provide an example).
- How likely are you to buy clothing made of more sustainably-sourced and sustainable materials (e.g., wool, hemp, silk, etc.) which are more expensive and less available, if you were aware of the considerable health and environmental impacts of synthetics? (0-5, 0 being not at all, 3 being neutral, 5 being very likely).

The survey was distributed in both English and Dutch. Each question was asked for a specific purpose. As such, the justification is as follows:

- Gender is relevant as there is a potential difference in the opinions/level of knowledge between men, women and others.
- Similarly, age and occupation may be an indication of a generational variation between opinion and level of knowledge.
- Country of residence is an indicator of a potential difference in opinion and expertise due to geo-cultural variation.
- Checking their labels is an indication of their habits and level of awareness about what they are wearing.
- Indication of the level of knowledge about the impacts of synthetics in clothing.
• Is there a potential desire in consumers to learn more about the clothes they buy?
• What is it that consumers care about most?
• What is the method that is the most desired and easiest to use?
• What do consumers know about alternatives?
• Are consumers willing to pay more for better, and healthier products?
• Approximately 166 people from 15 countries responded to the survey and completed the questionnaire.

To begin, respondents were provided with a description of the purpose of the survey and a definition for synthetic fibres. Respondents were also made aware that they would remain anonymous and that they may quit the survey at any point in time. In total, 59 men responded and 107 women responded. Respondents reside in the following countries: Luxembourg, Netherlands, United States of America, Poland, Sweden, Norway, Austria, New Zealand, Holland, Canada, Ireland, Pakistan, Indonesia, South Korea, and Australia.

**Results**

Based on the answers, one is given the indication that on average, approximately 20.74% of consumers check their label always, 69.55% checked their label sometimes and 9.72% never check their label. This is critical as a majority of consumers are unaware of the materials that they are exposing their body to and the potential toxicity of that material. Furthermore, 88.55% of consumers are unaware of any adverse health impacts associated with the use of synthetic fibres in the textile industry. For the remaining 11.45% who believed that they were aware of adverse health effects, nearly all of the responses were ignorant and misinformed. Rather than knowing about direct health impacts, the responses were mainly about the adverse impacts of clothing in general. For example, discomfort and associated smell. Thus, one can assume that nearly all consumers are completely unaware about how their clothing can impact their health and well-being.

When asked what information they felt that they should be provided with upon purchasing their clothing, the number one answer was the chemical content of the clothing with 69.35%. The remaining results are as follows: country of production (68.62%), who made the article/their working conditions (68.52%), the associated health impact on consumers (63.44%), environmental impacts (59.36%), means of disposal (42.96%), and none of the above (5.11%). Furthermore, a vast majority of consumers prefer that the information is provided via the label.

In addition, upon questioning whether there are better alternative materials, approximately 69.75% were unsure. Those that were sure indicated that wool, hemp, silk, bamboo, linen, and fur (but, they were uncomfortable with that idea because of animal cruelty). Some also stated that recycled synthetics are a good alternative. However, a majority indicated that cotton is the best alternative.
On average, consumers were neutral when it came to wanting to better understand the sustainability of the clothes that they bought. Similarly, they were neutral about paying more for better, more sustainable clothing. Consumers who indicated that they were more interested in learning more about their clothing also indicated that they would be willing to pay more for their clothing. However, some respondents indicated that although they would like to wear more sustainable-sourced, healthier materials, they simply could not afford them.

**Gaps in Data**
There are some potential knowledge gaps, for example, more men are needed for a proper gender comparison. There is also an uneven age distribution as a majority of respondents were 34 years old and younger. Similarly, the initial survey response count was 176 respondents. However, 10 survey responses were inaccessible. Furthermore, more respondents from each country are necessary to get a better geo-cultural understanding.

**Conclusion**
Synthetic fibres are cheap and offer a wide range of utility that other natural fibres cannot offer. They are nearly ubiquitous among clothing and textiles, worldwide. The production, distribution and consumption of synthetic fibres is increasing exponentially with the global advent of fast fashion. However, the use of synthetic fibres comes with significant environmental and health costs. Textiles, as a result, are a major global polluter, contributing to increasing greenhouse emissions, environmental degradation, water pollution and hazardous health impacts.

Finding sustainable alternatives is essential to reduce the damaging environmental effects of synthetic textiles. However, issues we identified that exist currently - both through perusing the existing scientific literature and through collecting original global data - include a lack of awareness regarding the issue of synthetic textile pollution, the affordability of sustainable alternatives, and lack of political will to change. Solutions to consider include increasing consumer awareness, changing behavioural habits (clothing purchases, clothes washing, etc) and adding synthetic textile pollution to the global policy and governance agenda.
### Annex 2

**Ideas of fashion sustainability**

<table>
<thead>
<tr>
<th>Types of textile</th>
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<tbody>
<tr>
<td><strong>Natural fibers</strong></td>
<td><strong>Synthetic fibers</strong></td>
</tr>
<tr>
<td>Natural fibers obtainable from an animal or vegetable source[^1]</td>
<td>Synthetic fibers manufactured using plant materials and minerals[^2]</td>
</tr>
</tbody>
</table>
| **Plant fibres** | - viscose comes from pine trees or petrochemicals,  
- acrylic, nylon and polyester come from oil and coal.  
Viscose fibre is obtained from the cellulose; versatility allows imitating materials such as cotton or silk.  
Polyester is a synthetic material, strong and easy to maintain. Its aspect is smooth and glossy.  
Nylon fibre is tough and resilient, need not be pressed. |
| Plant fibres include seed hairs, such as cotton; stem (or bast) fibres, such as flax and hemp; leaf fibres, such as sisal; and husk fibres, such as coconut. |  |
| **Animal fibres** |  |
| Animal fibres include wool, hair and secretions, such as silk. |  |

**Sustainability**

- Cotton plant has an eight to nine month renewable life cycle[^3].  
- Farming is becoming more efficient (less pesticides required, irrigated from rain, and for every pound of cotton fiber, there are roughly 1.6 pounds of other useful products being created, such as cottonseed oil, dairy feed, and mulch[^4].  
- Linen, hemp, and silk require less chemicals (and in some cases land and water) for production[^5].  
- Organic cotton is not treated with pesticides, insecticides, herbicides and Genetically Modified Organisms[^6].  
- Longer lasting shape and color than cotton  
- Easier to wash thus less energy and detergents are required  
- Dry quicker so less drying is required  
- Less water is used for manufacturing in comparison to conventional cotton  
- No land or crop diversity loss  
- Possibility of recycle and minimise plastic waste

[^3]: [https://www.barnhardtcotton.net/sustainability/](https://www.barnhardtcotton.net/sustainability/)
[^4]: Ibid
References

[1] Cotton accounts for 8-10% of pesticides and up to 50% of all pesticides used in developing countries (WWF, 2013).
[2] It’s estimated that a single textile factory can use 200 tons of fresh water per ton of dyed fabric.
[17] Ibid
[23] https://www.uni-kassel.de/fb07/fileadmin/datas/fb07/5-Institute/IBWL/Wagner/EMBS/Correas_Silvia_expose_EMBS.pdf
[27] http://edepot.wur.nl/440067
[29] https://www.theguardian.com/sustainable-business/2016/may/18/recycling-nylon-bureo-patagonia-sustainable-clothing
[31] https://www.sciencedirect.com/topics/materials-science/synthetic-fiber
[32] https://www.barnhardtcotton.net/sustainability/
[33] Ibid
[34] https://sustainabilityinstyle.com/synthetic-and-natural-whats-the-diff/