Can We Fix the Gap with *Future Ready*?

Can we design a place, where our friends, families and neighbours, can thrive? *What if we can?*
Summary

This report explores how the gender data gap affects the designs and advice we provide at WSP. The gender data gap is where previously considered objective data is in fact flawed by not accounting for other genders in particular, women. It is not intentional, but it has been taken for granted by society as a whole for many years, hence creating this gap in experience. It has impacted the historic planning and construction of urban areas using male-tailored dimensions and user behaviours, which, once translated into physical designs, put women at a major disadvantage in their experience of cities. It is within our power as designers, engineers and consultants to change this. This report analyses gender inequality in urban infrastructure through the lenses of urban design, transport, buildings, and safety at work, using statistics gathered from our survey supported by evidence from existing literature. Some of the areas highlighted may inspire moments of recognition or be things which you may never have considered but now are glaringly obvious. This is not an exhaustive list, but more a starting point for further thought.

This report finds that women experience accessibility issues in all four areas; they are excluded in male-dominated green spaces or parks, face longer wait times for public toilets, suffer limited mobility due to complex travel patterns, and have increased risk of injury at work due to improperly fitting personal protective equipment (PPE). More inclusive approaches to design have been outlined in this paper, and the conclusion is clear: adapting the built environment to suit the needs of all genders drives prosperity for everyone. Several of the factors impacting our gendered experience are closely interlinked. By finding a simple solution to one, wider benefit can be found. Vienna’s gender mainstreaming in parks has driven gross domestic product (GDP) through increased exercise and health in young girls, universal toilets allow accessibility for parents or carers of different genders, improving transport security through CCTV reduces costly repairs following vandalism, and adapting poorly fitting PPE opens accessibility to other ethnicities. Furthermore, the switch to inclusivity is becoming increasingly important along with the rising prominence of the United Nation Sustainable Development Goals (SDGs). This framework acts as a guide for government, business, and non-governmental organisations (NGO) to measure their progress towards sustainability – a factor which today largely determines competitive advantage through consumer demand, attracting investment, and averting financial risks from climate change. We all have a responsibility to uphold these goals and closing the gender data gap is a significant step in this process.
Introduction

Have you ever come across in your daily life in the built environment something which you feel is not designed with you or your user needs in mind? ‘Reference man’ or more recently known as ‘reference person’ has been utilised for over 45 years as the benchmark for medical studies, scientific experiments and in design of the built environment and services. The term ‘Reference person’ typically implies the following average characteristics: age 20–24, 68.5 in, 154 lb, Caucasian with a Western European or North American lifestyle. While the reader may identify with aspects of the above, it is likely there are characteristics which do not apply. The need for an average model is a necessary assumption as a starting point, however, unfortunately for many years this has been the only consideration. This has created a series of design standards and services based on these core characteristics that many do not identify with. A gap in data, design and relevance.

The United Nations Sustainable Development Goals (UN SDGs) recognise many of these gaps in our current standard provision and outlines a shared global blueprint to create the world we want for people now and into the future. The gender data gap refers to all the areas where there is missing data on the female experience and where male has been taken to mean the norm which subsequently leads to inequalities. Within the 17 SDGs, Goal 5 focuses on the role development can play in reducing gender inequality. All people are different and by no means can one person be defined by a short list of characteristics, however there are common experiences and user requirements for different genders. An example is cycling, an individual’s choice of transport mode will be made based on a wide range of factors. Typical data on cycling tends to focus on peak travel which shows mostly men travelling. However, a study by C40 Cities Climate Leadership Group found that more women travel outside of peak hours when roads are quieter and thus can be missed in typical studies. Women tend to be more risk averse and therefore are more deterred by aggressive & speeding drivers. Designs which improve safety for users with segregated and wider lanes, not only improve the experience for female cyclists but also the existing male cyclists. The study also found that the recommendations appealed more to other protected characteristic groups such as ethnic minorities, the elderly and children. By encouraging more people to cycle, there are significant carbon benefits to help us reach our net zero goals. Mode shift alone is predicted to reduce greenhouse gas emissions from transportation by over 32% by 2030, overall providing a more healthy, sustainable city.

This paper will apply data supported with anecdotal feedback and global examples to show how simple changes in design can create significant benefits for the overall population. Can we design to target Goal 5, improve gender equality and society as a whole?

Scope & definitions

There are many facets of an individual’s identity, including age, race, religion and gender, the latter of which is a spectrum comprising cisgender, transgender, binary and non-binary identities. It is acknowledged that sex and gender have different definitions. Within this paper gender is defined as the roles, duties and responsibilities which are culturally or socially ascribed to men or women. This paper focuses on binary gender due to the existing research and studies which help to build a picture of common user behaviours. It is not intended to define any person by these aspects, but rather to create more inclusion across the spectrum by considering them.

The Charities Aid Foundation definition has been followed where:
- the concept of “women” refers to a heterogeneous group, where social and personal circumstances, such as being old or young, being a single mother, or belonging to an ethnic or religious minority, shape the challenges and needs they face in cities in various ways.
- it is acknowledged that people whose gender identity does not fall into the binary male-female schema are also likely to have a differentiated experience of urbanization, public spaces, urban resources and city services.

THINK differently,
DESIGN differently.
In order to measure differences in gender experience, a mix of quantitative and qualitative indicators have been used. Quantitative indicators measure numerical changes over time, for example gender split in the workforce, whereas qualitative indicators measure changes in experiences, attitudes or perceptions. Unfortunately, often data is not sex disaggregated and so these aspects can be lost. Caroline Criado-Perez, the leading author of ‘Invisible Women: Exposing Data Bias in a World Designed for Men’ states the gender data gap is both a cause and consequence of the ‘one size fits all’ male norm. There is a widely common bias across societal assumptions that causes seemingly objective data to not accurately reflect the true population. The design failures are not intentional, but rather the result of missing information.

This paper is focused on the UK and its built environment, although the key themes and recommendations could apply to many regions and provide benefits. Global expertise has been drawn upon to strengthen our understanding of impactful inclusive design practices and ensure success in any recommendations put forward.

**Industry context**

Despite the fact that half the population are women and females are an equal proportion of residents in towns, cities and rural settings, this is not reflected in the gender split of those who design our built environment. Taking this further, many buildings and transport networks are still only halfway through their design lives and so were designed and built in a period where societal norms meant the workforce was majority male. The foundations of our infrastructure have been designed from a 99% male perspective.

Diversity does not just provide a better user experience for all. It has been found that companies in the top-quartile for gender diversity are 21% more likely to outperform national industry peers on operating margin and also are 27% more likely to have industry-leading performance on longer-term value creation.

Gender inclusion is not just a focus for women, when gender inclusion is considered within design and engineering it creates opportunity for consideration of the cumulative and intersectional impacts of gender, sexuality, ethnicity, race, income, class, ability, and age.
Living, working & using our services

Female Engineers
- Engineering Professionals
  - 12%
- Civil engineers
  - 13%
- Mechanical engineers
  - 9%
- Electrical engineers
  - 5%
- Building & civil engineering technicians
  - 16%

Female Transport Workers
- Managers and directors in transport & distribution
  - 25%
- Road Transport Drivers
  - 6%
- Bus & coach drivers
  - 10%
- Train & tram drivers
  - 8%
- Rail transport operatives
  - 8%

Female Urban Designers
- Environment professionals
  - 38%
- Architects
  - 27%
- Town planning officers
  - 44%
- Construction project managers & related professionals
  - 14%
- Building & civil engineering technicians
  - 16%
- Gardeners & landscape gardeners
  - 15%
- Construction & Building Trades Supervisors
  - 3%

Sources
1 World Bank, 2020
2 Statista, Population of the United Kingdom by gender, 2019
3 Office for National Statistics, Census data 2011
4 Office for National Statistics, Labour Market Overview, UK: June 2020
5 Transport for London, Understanding the travel needs of London’s diverse communities, 2012
6 Office for National Statistics, Annual population survey - occupation by sex by employment type, September 2020
Future Ready Gender Trends

At WSP we apply Future Ready™ to see the future more clearly through key trends in climate, society, technology and resources, and then work with our clients to advise on solutions that are both ready for today and the years to come. Future Ready puts WSP at the heart of delivering a sustainable, prosperous, resilient society.

Today as we look across the UK there is an established trajectory of more women participating in the labour market. Although it may feel the norm now, this change contrasts to societal norms from when our built environment was created, cities designed and the working week with its typical commute established. This paper will further discuss some of the strains and challenges now associated with not adapting to these changes.

Women’s roles have changed a lot, but common responsibilities have remained. Currently, 3 in 10 mothers with a child aged 14 or under have reduced their working hours because of childcare reasons in comparison to 1 in 20 fathers. Evidence shows an unequal division in the unpaid work between men and women, with women putting in on average 10 more hours per week. Unpaid work constitutes tasks which need to be done for general wellbeing such as cooking, care responsibilities, cleaning and laundry etc. Many fall into the ‘care sandwich’ looking after children, parents and grandchildren, however, it is not all care related as women do more unpaid work than men in every age group from 25 and under to 56 and over. Unpaid work in itself is a factor which impacts the differences in women’s user behaviour from males.

Looking forward, there are more signal trend indicators for shifts within our gender roles. Trends show that for the next generation many life milestones will occur later in life, along with changing attitudes to childcare and working patterns. Covid19 has also created a disruptive impact as the lines between work and home life have blurred. The responsibilities of unpaid work as well the importance of preserving wellbeing have come to the fore. As these changes continue to progress, society will continue to develop different user behaviour to which our built environment should respond. The role may change but the user need will remain so we should design for it now.

The way we move around our cities, the way we design our neighbourhoods, and the way we plan infrastructure are all impacted by changes in social and cultural norms. Our future is today’s generation of children, and therefore building for the future must start here. Designs for inclusive, accessible playgrounds and parks encourage integration of children of all ages and abilities. This lays the foundation for widespread inclusivity as the norm in future society as these children grow to become the engineers, designers, and policymakers of the next generations.

We believe that for societies to thrive, we must all hold ourselves accountable for tomorrow.
**Why is it Important?**

Inclusion is important to the wellbeing of our society. UK law protects everyone’s rights to an equal experience. Internally businesses are setting targets to ensure their workforce and future talent is diverse and inclusive. At WSP, the UK Diversity and Inclusion (D&I) Strategy 2021 – 2024 outlines that D&I is embedded in all that we do, making it a practice and a culture that everyone at WSP UK understands and that all those we work with support. By creating a truly open and inclusive organisation, at all levels, it reflects the communities we work in, and represents all our different voices. We want to use our position as a leading professional services company to influence the sector and drive D&I into the core of what we do, across both the employee lifecycle and the delivery of our projects, reflecting the communities we serve 1. It makes intuitive sense we should apply these principles to the world around us and the projects we develop for society.

**Equality Act & Beyond**

The Equality act was introduced in October 2010, it requires all goods, facilities, services and premises to be accessible to all 12. The law requires ‘reasonable adjustments’ to be made to ensure no person is discriminated against as a result of any protected characteristics (i.e. age, sex, race, disability). There are many design standards and codes which outline how to improve accessibility or safety for protected characteristics, however, these standards can sometimes outline the bare minimum. Equality doesn’t mean treating everyone in society the same, it means considering each member of societies different needs to be able to ensure they can interact in a similar way or aren’t negatively impacted. Birmingham New Street is an example where Network Rail and WSP thought beyond standards to consider users with disabilities and how to better shape their experience.

**We have the opportunity to engineer & shape the benefit**

Across a diverse range of global industry sectors, governments and businesses are increasingly seeing the major benefits of incorporating the UN SDGs into their agendas. This is necessary not only to ensure environmental, social and economic sustainability, but to remain competitive in a changing market. Sustainable business models related to the SDGs could open economic opportunities worth up to $12 Trillion USD and create up to 380 million jobs by 2030 14. Clients are recognising the rise in importance of the Sustainable Development Agenda and expect this framework to be integrated in the outcomes delivered. Clients will request competitors to explain how they are considering D&I in project teams and ongoing sustainable values for wider society. The world of engineering and design has proven crucial in meeting the SDG targets – with engineers leading roles in providing reliable and affordable energy, safe water and sanitation, resilient transport, and infrastructural development 14. Closing the gender data gap within all aspects of urban planning is an essential component in upholding the SDGs - particularly for Goals 5 (Gender Equality), 10 (Reduced Inequalities), and 11 (Sustainable Cities and Communities) 2.

The Sustainable Development Agenda is mirrored in what we stand for at WSP, creating solutions which will shape the communities of tomorrow and help societies thrive sustainably, and holding ourselves accountable for delivering these truly sustainable and innovative outcomes. The golden thread through our business which drives our ability to deliver a sustainable, prosperous, resilient society is our Future Ready programme. Through our work, WSP has made a significant contribution to the 9 of the 17 SDGs, these being Goals 5 to 15 14. However, of the 9 SDGs listed in WSP UK’s 2019 Annual Sustainability Report as being positively influenced by our work, the goal influenced to the smallest extent is identified as Goal 5 - to achieve gender equality and empower all women and girls 13. The challenge outlined in this report is how can we think differently and design to include and empower women and girls.

**Why now?**

A Future Ready approach helps us to recognise trends and consider any potential challenges now. Looking to the future, automation is becoming more integrated into design and construction but also Smart infrastructure in our built environment. Caroline Criado-Perez discusses how the gender data gap in our existing data could lead to significant impacts as it becomes written into the code of our artificial intelligence (AI) 6. We must design out these inadvertent issues in our algorithms now before they become taken out of our hands in an automated decision-making process. The ideal with AI technology is to reduce our human biases which cannot be done without re-examining our data and current standards to better suit all.

*Making our workplace more equitable in every way is simply the right thing to do. Diverse, inclusive teams - and organisations as a result - thrive.*

Mark Naysmith
WSP
UK & MEA CEO
Birmingham New Street, Network Rail WSP (GRIP 2 - 4)

Birmingham New Street railway station underwent a significant 5 year redevelopment which opened in 2015. It is a major transport hub with over 80% of train services to Birmingham traveling through New Street and the station is relied on to help connect the country. A key driver to redevelop the station was the anticipated significant increase in passenger numbers. In 2009 to 2010, the station had 25.3 million passenger entry and exits by 2018 to 2019 this had increased to 47.9 million 12.

The architectural design was focused around the concept of movement, as part of this the design team considered passenger movement and how to make wayfinding easier.

The principles of the design were to provide architectural clues to assist mobility impaired passengers navigate their way through the vast open space within the station concourse.

One example is the ‘pebble in a pond’, a central, glass block feature embedded within the concourse floor. This architectural feature acts with the ripples of granite that surround the pebble. The elongated glass diamond pebble in the floor has a distinct contrasting texture which can be found with a cane or by a seeing eye assistance dog. This diamond acts as a central decision point as a directional guide heading towards the ticket office. Clever retail placement has added shops with distinct smells, in this case a coffee shop positioned to one point of the diamond. This feature was communicated to disability stakeholder groups and then allows a user with a visual impairment to navigate the concourse. For example, when positioned on the pebble, they would know if they can smell coffee behind them the ticket office is positioned directly in front of them.
Within this report we consider four key components of our built environment, all of which are within the hands of our designers, engineers and consultants to change. Consideration has been given for the current provision and a gender lens applied to find the gaps.

Gender equity intersects with the built environment in several key areas: these are access, mobility, safety and freedom from violence, health and hygiene, climate resilience, and security of tenure. Some of the areas highlighted may inspire moments of recognition or be things which you may never have considered but now are glaringly obvious. Several of the factors impacting our gendered experience are closely interlinked, and by finding a simple solution to one wider benefit can be found. This is not an exhaustive list, but more a starting point for further thought.

In addition to academic research referenced within this paper, a survey was conducted by WSP to supplement this which is referenced within this report. The results are not statistically representative for the UK, however, they are indicative of real experience and show further commonalities in gender experiences.

Urban Design

In the male dominated world of planning and design, able-bodied, working males have been considered the ‘neutral’ city user, hence urban spaces and layouts have been designed to fit their needs. We are seeing trends in retrospective changes to improve inclusivity however the majority of city planning still follows a patriarchal gender norm structure, which better caters to men being breadwinners, requiring full access to public space, land, and property, whilst women are caregivers and more restricted to private households. These norms are no longer representative of many.

Urban layout

One area of urban planning in which male-dominance has created a significant gender gap is modern ‘zoning’: when urban layouts are sectioned into zones which separate commercial from residential areas, as well as prioritising cars over public transport. In many cities, these commercial and residential zones are not only formally segregated, but also physically distant from each other, further impinging on women’s mobility and restricting access to urban areas. This issue is exacerbated for women who are more likely to be accompanied by children, elderly or disabled, as will be discussed in the following sections.

Having to do a school run using public transport. Transport routes tend to be hub and spoke, designed to get you into the city centre. Provision isn’t great where I live to make journeys between areas around the edge of the city. E.g. it is much quicker to drive to work because I would have to get a bus into the city centre and then catch another to head back out again.
Another prominent area where women's access is restricted is green spaces and parks. Women and children struggle to gain access to parks for recreational activities because sports, usually male dominated, take priority in the vast majority of these spaces. Some examples of urban redevelopment programmes involving creation of green or public space to foster social cohesion have been shown to do the opposite - largely attracting young males. The typical green space easily becomes a football pitch and not much else. Furthermore, lack of safety and security is a key deterrent for women in parks which lack adequate lighting and clear sightlines, as this can create a feeling of entrapment or increase the likelihood of violence and assault.

Vienna, Austria, has led the movement of gender-inclusive city design, beginning in the mid-1990s with a piece of research into gendered transport statistics. After a clear gender gap became evident, the city was forced to rethink its planning and design strategies. A major area of improvement was provision for females within public parks. Vienna’s Women’s Office found that the number of girls using the city’s parks declined rapidly once they reached the age of around 9 years old. Unsurprisingly, lack of physical activity and recreational facilities contributed to poor mental health in girls.

Planning officers and female sociologists investigated why this occurred, finding that girls felt uncomfortable competing with boys for this single open space, which was largely dedicated to male-dominated sports, and therefore tended to avoid them entirely, allowing the space to become ‘male’ by default.

The city revamped its parks guidelines based on the evaluation of six pilot projects, four of them with the active participation of girls. Subdivision of single open spaces reversed this trend. Footpaths were added to the parks for added accessibility and mobility, as well as new recreation facilities such as volleyball and badminton courts. Seating areas, trees, and shade provided increased opportunities for recreation to women and children.

Following this shift in park design, the resulting changes went beyond the desired effects of improved mental health in girls. The increased physical exercise also increased young people’s bone density, reducing the risk of osteoporosis later in life. The total cost to Gothenburg of the estimated 1,000 fractures a year resulting from falls (three-quarters of which are suffered by women) is around 150 million Swedish kronor (SEK), of which 110 million SEK can be accounted for by injury to females. As the report concludes, ‘If an increase in the city’s support for girls’ sports of SEK 15 million can lead to a 14% reduction in future fractures due to osteoporosis, the investment will have paid for itself. When we account for female socialisation in the design of our open spaces and activities, we again save money in the long run by ensuring women’s long-term mental and physical health.

Another good example of an ‘Applied Gender Mainstreaming’ approach adopted to actively address inclusive design issues is a children's playground in Trappes, France, which caters to children of all genders and abilities. The intention is to provide a variety of spaces suiting a range of active and passive activities rather than a single space with a football pitch at the centre.

These gender-inclusive parks have successfully incorporated the Sustainable Development Agenda into their design, specifically Goals 3, 5, 9, 10, and 11. They have had a significant impact on females, motivating them to spend time in the park and providing a sense of belonging to women and girls. However, the benefits of such inclusive green spaces provide benefits beyond gender – fostering improved mental and physical health, climate change adaptation, development of local economy through encouragement of concerts and events and increasing biodiversity.
**Glade Lane Canalside Park, WSP and Ealing Council**

WSP held online workshops with Ealing Council officers to identify issues and share ideas for what might benefit the community most. Key areas of importance were connecting local communities, urban cohesion, cost and practicality of maintenance, and reducing issues with littering and anti-social behaviour. Two peer review workshops with WSP’s Global Landscape Forum provided insight and international perspective from co-professionals in other countries.

User focus is at the heart of the Future Ready Landscape approach, however, Covid-19 removed the opportunity to meet with end-users in person. Instead, WSP conducted a desktop study using Experian mosaic data to find out more information on local demographic groups building a clear picture of who lived in the area, where they may travel and potential future uses for the park. WSP identified 3 main user groups; picnic family, senior citizen and young professional, which were used to create journey maps based to test and validate proposals. The young professional was a new group defined based on understanding of extensive new developments coming forward in the area from London Plan and the West London Alliance development plans for the next 5 to 10 years.

Future Ready and gender mainstreaming principles were used throughout the process. By applying the lens of each persona, the team identified opportunities for making the space inclusive from walkways suitable for prams through to increasing the number of access points to the park and improving passive surveillance. The proposals were also tested for seasonality and off-peak uses, to ensure there is engagement and achieving active zones despite the cold season.

Some of the main proposed design features are;

- Accessibility for different user groups with a selection of pedestrian only and mixed-use including cycle paths
- Selected Smart Hot Spots accessible to the public with free wi-fi, located in strategically safe and well-lit areas
- Connectivity to the surrounding amenities opening up the park to three boundaries from the previously restricted access
- Inclusive activities for all gender and mobility:
  - Quiet zones with seating, viewpoints, shelter and contemplation areas
  - Active areas with outdoor fitness, group exercise area, workshop area and a lunch breakout spot
  - Lawn with open area for recreational use and community activities
- Climate resilience with natural drainage in the design
- Habitat creation which provides educational opportunities for nature play and bird watching, as well as protecting previous existing toad population
- Biodiversity enrichment to diversify habitats including species rich meadows providing dual benefits of cost saving and low maintenance

**Building Design**

Within building design, the gender data gap usually presents itself in relatively minor inconveniences, such as struggling to reach handrails or cupboards, which have been erected to suit average male heights. Whilst irritating and non-life threatening, accessibility issues caused by building design impact women’s lives daily.

Toilets are the least well designed things in public spaces. Example I come across the MOST is the location of the hook on the back of the door (if there even is one) - it is usually right at the top of the door and is obviously put in for looks not practicality - if you are on the toilet you cannot reach the hook or anything you hang off it - normally handbag. Put it 2/3 to 1/2 way down the door!

**Toilets**

The main area of building design in which gender inequity is highlighted is toilet space. When designing for equal access to toilet facilities, one of the seemingly obvious answers is dedication of equal space to male and female toilets. This is where we must consider user experience through the lens of gender equity - creating equal outcomes for all genders although the distribution of resources may be quantitatively ‘unequal’.

As male toilets generally consist of a combination of cubicles and urinals, the number of people who can use them at once per square foot is therefore much greater than in female toilets, which contain only cubicles. WSP’s survey found that 78% of men who can use them at once per square foot is therefore much greater than in female toilets, which contain only cubicles. WSP’s survey found that 78% of men either sometimes or often could access toilet facilities without a significant wait, compared with 63% of women. This problem is exacerbated by the fact that females spend up to 2.3 times longer using toilet facilities than men for a number of reasons. Furthermore, women are more likely to be accompanied by a child, elderly or disabled person who requires assistance.

However, the effects of toilet design and accessibility are felt beyond the scope of females. Our survey revealed that both genders experience lack of accessible baby-changing facilities, and when provided, this tends to be within the female or disabled toilets, creating further issues.

I can never reach things up high. At 5ft3 I’m a shorter person but not abnormally short for a woman. The same goes for reaching rails on trains. If it’s busy and you need to stand up the aisles I’ve no way or supporting myself and often fall into people.

There are rarely any child changing facilities accessible to fathers. There are rarely toilet facilities where a father can take his daughter.
Designing for Inclusivity through Universal Washrooms and Change Rooms in Community and Recreation Facilities highlights the benefits that their inclusive facilities can bring. These can be provided either as additional facilities or instead of the traditional male and female. These not only respond to a number of the challenges highlighted within our survey they also:

- remove barriers to those with disabilities,
- are more inclusive to transgender and non-binary people, who often feel unsafe or uncomfortable using gendered toilets.

Whilst some users may object to non-gendered facilities on the basis of safety, security or privacy, recent universal washroom designs have potentially increased privacy and safety. Universal stalls can be made large enough to accommodate more than one person, and include individual toilets, sinks, and bins enclosed within a single stall and locking door. This provides privacy and discretion around individual needs, for example, a diabetic who needs to inject insulin and dispose of medical waste.

The provision of universal washrooms and change rooms in public and private spaces—either alone or alongside gender-designated options is an opportunity to champion accessibility and inclusivity for all. This will not only provide an inclusive atmosphere but can drive further customer spend in hospitality and retail as individuals and groups no longer need to return home to use their own facilities thus extending the opportunity of spending.

Transport hubs and modes

One of the most significant impacts of the gender data gap is on women's mobility. Socio-economic factors such as age, employment status and geographical location impact on the mobility of both males and females, however, studies have shown that women are disproportionately affected by these factors. This massively affects the way in which women interact within and outside communities, as well as the opportunities available to them.

Data shows women are much more dependent on walking, cycling, public transport modes, such as buses, and intermediate means of transport (IMTs) than men. For example, in France, men only use public transport for 10% of their trips, and two thirds of passengers on public transport networks are women. In 2017 across England, a third more women than men travelled by bus and a third more men than women travelled by rail.

This is largely because differing responsibilities cause men and women to follow different travel patterns. Men’s journeys typically involve commuting to and from work, perhaps with occasional stops, but generally with minimal deviation from their original route. Therefore, men’s journeys are largely facilitated by the linear routes served by rail, commuting directly from suburbs to inner cities. Due to the increased household responsibilities held by women, their travel patterns are multi-purpose and follow complex patterns requiring numerous stops as they move between work, school, childminders, parents, and hobbies. In Greater Manchester, women are making about 9% more trips per weekday than men. As well as children, women are also more likely to be accompanied by a disabled or elderly person. Having a young child in the house will increase the number of trips a woman makes by 23% in London. These multi-stop routes generally occur over a smaller geographical area than travelled by men, typically within residential and suburban areas, which are not served by railway or tram lines following direct links from rural or suburban areas to city centres.

For this reason, housing location also disproportionately affects women’s mobility, as this depends on how well their area is served by public transport. Mixed land use makes it easier for women to balance paid work with their domestic responsibilities, as it tends to reduce the distance between housing, workplace, and public services. In a potential future of more equal division of unpaid work the strains of complex travel patterns which are not well supported by transport networks will continue to negatively impact.

The issue of affordability also restricts women to a great extent, opting for cheaper bus travel, rather than quicker transportation methods or private travel. This negatively impacts on their time and may be a contributing factor to why their hours spent doing unpaid work are higher. Some studies have also found that women are more likely to use low-carbon methods of travel and perceive the risks of climate change to be more serious than men do. This may cause women to choose active travel modes, however, our survey revealed strong qualitative feedback that many women do not feel safe using designated routes due to priority of cars on roads. 62% of men agreed or strongly agreed that paths consider their or someone in their care’s user needs, in contrast to only 46% of women. Two simple solutions are segregated pathways and improving conditions of pavements this improves the experience for women, pushing prams, children, the elderly and those in wheelchairs.

Pathway maintenance is sometimes poor, particularly pavements which are narrow which can make it hard to walk on. There should be MUCH better enforcement of pavement parking. Often pavements are almost impassable, particularly with a pram or wheelchair.

Toilets that don’t fit prams are frustrating!

Transport hubs and modes

Most used transport modes, split by gender - 1 was ranked most used

<table>
<thead>
<tr>
<th></th>
<th>Bus</th>
<th>Train</th>
<th>Walking</th>
<th>Cycling</th>
<th>Personal Car</th>
<th>Taxi</th>
<th>Tram</th>
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<tr>
<td>Female</td>
<td>4.04</td>
<td>2.82</td>
<td>2.17</td>
<td>4.84</td>
<td>2.40</td>
<td>4.45</td>
<td>5.53</td>
</tr>
<tr>
<td>Male</td>
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<td>2.78</td>
<td>2.37</td>
<td>4.12</td>
<td>2.32</td>
<td>4.63</td>
<td>5.71</td>
</tr>
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Night & Perceived Fear

In many cases, women’s accessibility may be limited due to perceptions which incite fear and anxiety of certain areas. These include dark or poorly lit areas, underground car parks, and pedestrian underpasses.\(^1^6\)

Restricting women’s mobility also restricts them from achieving their maximum potential in education, employment, and health. However, simple changes such as more lights and placing public transport stations in better-lit areas would help make women feel less vulnerable and at risk. The volume of women who appear in the public realm, particularly at night, is an indicator of the health and sustainability of a society and the safety of a city.

Guidance highlights that: the more that the built environment is designed with women in mind, the more women will feel safe, welcome and comfortable using public space and the more liveable the city will be for everyone.\(^3^2\) It becomes a virtuous circle.

"The main thing that I feel impacts my journeys and the routes I take, as a woman, is the lighting. In the winter, even when it’s not late, I always make a conscious effort to be in well-lit areas. I’ve recently discovered from chatting to my partner that most men don’t consider this at all."

50% of women surveyed said they often changed mode of travel to whether there is street lighting.

61% of males surveyed said they never changed their route due to anxiety or fear.

"I cycle to work (Covid-permitting) and should have a great 8-mile journey... I now avoid the park cycle paths because they are always covered with glass and poorly lit, and I avoid the canal tow paths because of fear of muggers... they are narrow, bumpy and poorly lit."

Case Study

Transport for everyone: an action plan to promote equality

The Department of Transport’s report titled Transport for everyone: an action plan to promote equality, actively considered what can be done to make transport more inclusive for all society and assessed the current strategies in place.

Surveys found that women wanted:
- safer night buses
- reliable taxis and mini-cabs especially at night
- good lighting and visibility, and CCTV cameras
- staffed stations
- more and better trained staff on buses and trains, especially at non-peak times

DfT has also introduced a number of initiatives to improve inclusivity:
- Secure Stations Scheme – this accredits train stations that have implemented a comprehensive package of security measures for both passengers and staff. 1300 stations are accredited under this scheme, with over 95% of overground and underground rail journeys, and 100% of DLR journeys, currently involving passengers starting or finishing their journey at a Secure Station.
- Increased CCTV, lighting, real time information, and help points.
- DfT supports cross government initiatives to tackle hate crime based on gender, sexual orientation, and gender reassignment, and have committed to strategies which tackle gender-based violence against women and girls.

50% of women surveyed said they often changed mode of travel to whether there is street lighting.

61% of males surveyed said they never changed their route due to anxiety or fear.

"The main thing that I feel impacts my journeys and the routes I take, as a woman, is the lighting. In the winter, even when it’s not late, I always make a conscious effort to be in well-lit areas. I’ve recently discovered from chatting to my partner that most men don’t consider this at all."

I cycle to work (Covid-permitting) and should have a great 8-mile journey... I now avoid the park cycle paths because they are always covered with glass and poorly lit, and I avoid the canal tow paths because of fear of muggers... they are narrow, bumpy and poorly lit."
DfT further identified the need to increase the numbers of women working in the industry. Currently, male employment in the industry is much higher - 73% male compared to 27% female. This is likely to increase women’s perception of safety on public transport.

**Improved security and accessibility for all, including gender and ethnic minorities who fear personal attacks and language difficulties.**

**Economic benefit** - 13% working age respondents to a survey said they had decided not to apply for a particular job in the last 12 months because of transport problems.

**Improved safety and CCTV will reduce vandalism or littering issues, hence eliminating costly repairs.**

**Education** - 40% young people in rural areas said that transport issues influenced their decisions about post-16 education.

**Health care accessibility** - 69% of missed maternity care appointments were due to transport or transport-related factors.

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**Safety at Work**

While workplaces have become safer in the UK, 693,000 workers still sustained a non-fatal injury in 2019/20. Women and men may be exposed to different hazards and risks at the workplace. This could be as a result of the type of work they do. Work predominantly undertaken by women is often presumed to be lighter, easier and safer than that undertaken by men. This causes a gap as it often receives less attention and thus less focus on how to mitigate the risks to improve safety. Protective legislation has fallen into this gap, for example, the European Union responded to a growth in musculoskeletal disorders with regulations on manual handling which misses women’s common reasons for musculoskeletal injuries. Women tend to suffer more from pain in the upper back and limbs as a result of repetitive tasks in both manufacturing and office work, with issues increasing during pregnancy. In contrast, men tend to suffer more from lower-back pain from exerting force in manual handling.

In addition, the exposure to the same risks may impact women and men differently because of their physicality, psychology and external factors such as their home life. A study shows that within the union of carpenters, women suffered more injuries from sprains and strains in their wrists and forearms than men. The average woman’s hand is shorter than a man’s, so when using tools, the placement will be different than intended in design and cause a loss of the tool’s functionality, mixed with the increased repetition of tasks this can lead to additional strain.

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**Average adult hand size**

<table>
<thead>
<tr>
<th></th>
<th>Length</th>
<th>Breadth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>19.3cm</td>
<td>8.9cm</td>
</tr>
<tr>
<td>Female</td>
<td>17.3cm</td>
<td>7.9cm</td>
</tr>
</tbody>
</table>
**Personal Protective Equipment (PPE)**

All employers in the UK are legally required to provide PPE required for their work. This can be anything from gloves to hard hats and protective suits. Again, the gender data gap impacts here where a woman’s size is generally just a smaller version of the ‘reference male’ size. A 2016 survey across a number of organisations and unions found that 57% of women said their PPE sometimes or significantly hampered their work. Again, by applying a focus on the different end users we can see other groups who will benefit from a range of PPE, for example when considering protective face equipment and respirators, these are typically designed for a white male face shape meaning they do not suit most women as well as a lot of men from black and minority ethnic groups or with facial hair. Trends show an increasingly diverse workforce in the UK, further considerations should include requirements for religious clothing and maternity ranges.

**Purple Boots Campaign, Women's Engineering Society (WES)**

WES conducted a widespread survey across construction on safety clothing and footwear. Just 29% of women who responded said that the PPE they use is specifically designed for women. Women’s feet tend to be smaller but also narrower meaning a men’s smaller size still is not the correct size.

While this may sound a minor difference, the wrong shoes can:
- increase the chances of tripping,
- lead to callouses, bunions, foot deformities,
- cause back and joint pain due to trying to correct for them,
- increase the risk of crushing your foot.

Many of the above we consider in safety risk assessments before entering sites to reduce the risk.

WES partnered with a manufacturer to develop and retail a new pair of boots. Through its campaign, WES was able to raise the awareness of women and so obtain PPE that was suitable for their size and shape.

In our appreciation of construction, design and on-going maintenance, ensuring the tools required, PPE provided and process suit all potential workers should be a core consideration. We can collaborate with stakeholders and supply chain alike to improve the existing provision and respond to requirements. By reducing any potential harm from conducting routine tasks we can help to reduce the estimated £16.2 billion UK cost of injuries and ill health from current working conditions.
What next?

This paper highlights numerous ways in which considering and then closing the gender gap can bring benefits to all society. Globally, the loss in human capital wealth due to gender inequality is estimated at $160.2 trillion. Designers and engineers have a real opportunity to fix the gender in design gap, and through Future Ready we are challenging ourselves to better consider and integrate the needs of women and other under-represented groups across our project design. Simple changes in what we design can bring significant benefits from GDP through to health and wellbeing, and we can all play a part in this vital change. Our challenge to you is to ask what actions you are taking to influence this change in the projects you are designing and the advice you are giving by considering these initial steps:

1. **Consider the end user**
   Do your design standards consider all? Could there be different requirements from different groups? Look at the demographics of your project area - are there any other groups who may benefit? Equality Impact Assessments (EqIAs) are an effective tool to identify how different societal groups (gender, sex, sexuality, race, age etc.) are individually impacted by your project.

2. **Involve women and other perspectives in design**
   Is your project team diverse? Would you benefit from end user analysis or creating personas? Promote an approach which is as participatory as possible.

3. **Have a conversation**
   You don’t know what you don’t know. The only way to find out is by having an open discussion. Through campaigns such as #ChoosetoChallenge launched for International Women’s Day, thoughts are challenged, and conversations are stimulated between all genders.

The economic gain, social inclusion, and environmental benefit generated from the inclusive designs outlined above reflect that creating gender equality is not a burden, but an opportunity. A change in outlook which reflects this is essential not only for progression towards gender equality and equity, but to pave the first steps towards inclusivity and progression for society as a whole.
Appendix

References

11. WSP (2021) UK D&I Strategy (2021 -2024)
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The authors would like to acknowledge the many professionals within WSP and externally who provided insight and guidance throughout the compilation of this report, many of whom also dedicated their time to reviewing this document. Their knowledge has been extremely valuable in shaping this report. We would also like to acknowledge the graphics team who dedicated time to putting this report together.

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Eabha Elliott is a master’s student at Queen’s University Belfast who co-authored this report during an 8-week internship at WSP. She is currently studying MSc Leadership for Sustainable Development, and has a strong interest in sustainable urban development and sustainable consultancy. She has developed many transferrable skills through obtaining her degree in particular; effective communication, credible presentation style and a drive to meet deadlines. She has built on these core skills during her project work at WSP, collating relevant evidence, considering different viewpoints then building a coherent and persuasive argument.

Further details of the survey
The survey was open over a 2 week period, from Wednesday 3rd February until Wednesday 17th February. It was comprised of 17 questions to investigate gender-based experience of the built environment.

It received 493 responses with an almost even split of male and female genders from across a variety of age ranges.

The survey contained a mix of questions asking users to rate their experience, likelihood of an occurrence and free text. The questions considered urban layout, building design, transport networks and modes. A sample question is included below:

13. Presence or absence of street lighting affects the mode of travel (I.e. walk, bus, taxi) I take at night

This data was then aggregated by sex, and then in some instances further considered based on age, location etc.
WSP is one of the world's leading engineering professional services consulting firms, bringing together talented people from around the globe. We are technical experts who design and provide strategic advice on sustainable solutions, engineering projects that will help societies grow for lifetimes to come.