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Not Enough Wheels to Go Round

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Executive Summary:

Popping to the shops, a wheel around the park, or a ramble in the countryside are considered "normal day-to-day activities" as defined under the Equality Act 2010 [1] and should be available to all as a right. AK Sen's Capability Model [2] offers a useful and positive model that places the emphasis on capability as potential, loosely expressed as an equation:

Capability = Impairment & Kit & Help

For example, a paraplegic with an electric wheelchair and appropriate help is capable of wheeling around a park. Estimating the availability of help is beyond the scope of this short study, so we focus on impairment and provision of kit. Given limited resource and scope we adopt an analytic meta-analysis approach pulling together published data at a national level.

We define *"1kActive"* as "*having the capability to wheel/walk at least 1 km over a relatively flat hard surface; safely, reliably, repeatedly and in good time"*. We have found the quality of available data is sparse and shockingly poor. Using what there is we show that to be 1kActive:

- Need: Around 7 million people, or 10% of the UK population, need a significant mobility aid.
- Provision: Only around 750,000 people have access to an appropriate mobility aid

There is clearly a chasm in provision – roughly 6.2 million people, or ~90% of those who need it, do not have easy access to an appropriate form of mobility aid for a 1kWheel.

Much work remains. Deeper more comprehensive studies should be undertaken to verify the estimates in this report, and to understand what is needed and where the obstacles lie. Very much better data should be gathered, e.g. by the Office for National Statistics. The current trial of e-scooters in target towns is an interesting development, and a similar experiment with mobility scooters might be valuable in future.

There is much that national government, local government and the voluntary sector can, and hopefully will, do to improve the situation. Whatever specific actions are taken, it is likely that in the near future there will be very many more disabled people with access to wheeled mobility aids. It is therefore equally important that infrastructure in urban, rural and outdoor spaces is put in place to support this.

1. Introduction

Popping to the shops, a wheel around the park, or a ramble in the countryside are considered "normal day-to-day activities" as defined under the Equality Act 2010 [1]. On average non-disabled Britons walk more than 3km a day [3], and everyone has this right on a "regular basis". Amartya Sen's Capability Model [2] offers a positive model that places the emphasis on capability as potential. It is the individual's choice whether they wish to exercise it or not. This deceptively simple model is an excellent framework in which to understand 'dis'ability, and may be expressed loosely as an equation:

Capability = Impairment & Kit & Help

For example, a paraplegic with an electric wheelchair and appropriate help is capable of wheeling around a park. Estimating the availability of help is beyond the scope of this short study, so we focus o impairment and provision of kit. Given limited resource and scope we adopt an analytic meta-analysis approach pulling together published data at a national level.

We define *"1kActive"* as "*having the capability to wheel/walk at least 1 km over a relatively flat hard surface; safely, reliably, repeatedly and in good time"*. In Sen's model, ability is a property intrinsic to the individual, and so we define a *"1kWalk"* in a similar vein, but the ability to walk 1km. A person who does not have the intrinsic *ability* to 1kWalk, can have the *capability* for a *"1kWheel"* with appropriate kit and help. Taking impairment as need, and kit as provision, we have two questions:

a) Need: How many people need some form of mobility aid to be 1kActive?
b) Provision: What is the level of provision and access to appropriate mobility aids?

Terminology is elusive and *ramble, scoot, stroll, walk, amble, jaunt etc* are sometimes used interchangeably. We use *"wheel"*, an emerging term of preference, and *"walk"*, exclusively as defined above. This avoids any implicit differences between urban and rural environments.

We proceed by estimating the number of people unable go on a 1kWalk and who therefore need wheels to be 1kActive. Next we estimate the level of provision nationally to allow 1kWheels. Data is typically recorded in answer to different questions and needs to be treated as semi-quantitative. Much depends upon how the question is framed and who is doing the asking. There is a world of difference between a self-report questionnaire, and a formal assessment of disability in a government benefits eligibility process. Furthermore there is a very wide range of different disabilities and consequent ability levels (everyone's level of impairment is unique), and a bewildering array of mobility scooters, powered wheelchairs, powered add-ons to manual wheelchairs, and so on that can be used to wheel around.

2. Need: How many people need some form of mobility aid to be 1kActive?

The Family Resources Survey [4] (pp17,20) states that *"14.1 million people reported a disability"* and that *"a mobility impairment was reported by 7 million people"*. It is unlikely that someone would self-report with a mobility impairment if they could walk further than 1km so we estimate that the people in this group have a maximum walking distance in the region 100m-1000m.

DWP's Stat-Xplore [5] offers detailed data on numbers of claimants for PIP, DLA and AA. PIP is rated by the distance a person can walk, and we infer cumulative maximum walking distance for the others.

Award	0-20m Walk	0-50m Walk
PIP (Personal Independence Payment)	1.35	2.15
DLA (Disability Living Allowance)	0.56	1.08
AA (Attendance Allowance)	0.48	0.75
Total	2.4	4

Table 1. Award type and estimates of population size with maximum distance walkable (millions, cumulative).

A Blue Badge for parking in disabled bays is available to those who have problems walking, including those with mental health disorders. Using Blue Badge Statistics, England 2020, scaling to cover the UK, and allowing for non-mobility disabilities we estimate ~3 million people are entitled to a Blue Badge in the UK for mobility issues, even if they haven't claimed one [6]. We assume the cumulative maximum distance this group can walk is in the range 10-100m, the order of distance from a disabled parking bay to eg a shop.

Strangely there are no official government statistics giving the number of wheelchair users in the UK, despite a freedom of information request [7]. NHS figures [8] give around 0.7 million, however as many counties report 0 registered wheelchair users this must be an under-estimate. Together with data from the internet [9], [10] we estimate an approximate figure of 1 million in a range of 0.7-1.3 million, and assume they are able to walk a maximum distance between 0m and 1m.

The figures summarised in the table below are cumulative, eg those who cannot walk 100m also cannot walk 1000m and (we assume) people on disability benefits also self-report as disabled. We discount the theoretical upper and lower bounds of the total UK population and the most disabled person.

Description	Cum max. distance		Size of group (million)	
	m.	range	size	range
Self-report disabled	*500*	*100-1000*	7.1	*±30%*
Blue Badge, entitled	*50*	*10-100*	*3*	*±30%*
Disability benefit, all mobility claimants	50	*±30%*	4	*±30%*
Disability benefit, enhanced	20	*±30%*	2.4	*±30%*
Wheelchair users	*0.1*	*0-1*	1	0.7-1.3

Table 2. Cumulative maximum distance walkable and cumulative population (*estimates in italics*)

Taking log-log transforms and regressing the cumulative population size against cumulative maximum distance walkable, we replace zero values and regularise data ranges to be additive in log-space. To gain an estimate of error bars on the prediction, we conduct a Monte Carlo random sampling (equal probability) of the data within the data ranges and estimate the prediction range to be within ±1 standard deviation, cf Figure 1. A bootstrap leave-one-out exercise gives an R^2 value of 0.76, giving some reassurance of internal consistency, and the inverse hyperbolic sine transform gives broadly similar results.

Rounded to the nearest half million we have an overall estimate of 7 million, in the range 5.5-8.5 million. In other words around 7 million people in the UK, or ~10% of the population, are unable to do a 1kWalk but could do a 1kWheel, ie be 1kActive, with an appropriate wheeled mobility aid.

3. Level of Provision

A market study on mobility scooters (RICA 2014) [11] bemoans the lack of reliable commercial data on market size but offers: *"best estimates put the number of units sold per year at approximately 80,000 and total number of UK users at approximately 300-350,000"*. Some of these will be all-terrain and some more suited for city use, however they should all be suitable for a 1kWheel.

Press reports point to a fast growing market, and a vibrant second hand market, which is good news. The estimate above of 80000 or ~25% pa [11] seems optimistic, whereas other estimates are fairly consistent: 7.3% [12] in the UK; 6.9% in the US [13]; 6.5% worldwide [14]. Using 7% we have the market size in 2022 as ~515-600,000. In principle this market may eventually grow large enough to meet the need, however some reports identify headwinds in market growth due to Covid, an economic

downturn and difficulty getting parts [13], so we make no attempt to predict further into the future. There is also the important issue of the high cost involved which will be beyond the reach of many.

A number of organisations rent or lend mobility scooters at the point of need, eg National Trust, Countryside Mobility, Shopmobility, Disabled Ramblers, and many others. This availability has great impact in access and visibility; each scooter may be used ~50-100 times a year, and gives the opportunity for people to experience the joy and freedom of being independently mobile. Anecdotally, and given the cost, the numbers of loan scooters available nationally appears to be low, perhaps of the order 1000. This has the potential of touching the lives of tens of thousands of disabled people, in principle punching very much above its weight, but is still well below the level of need. There are also reports of a trend in able-bodied people using mobility scooters [15] which is hard to quantify.

A recent survey [16] outlined the many difficulties faced by those that need powered wheelchairs including the very high cost of up to £40,000 (!), as well as a bewildering array of choice, but did not estimate the number of powered wheelchairs in the UK. One can only guess that the number is small, much less than the overall number of wheelchair users, and indeed much less than the number of those that need one. Of the ~1 million wheelchair users some may indeed be able to 1kWheel in a manual wheelchair, but given the energy and upper body strength required most will not. There are various power packs for manual wheelchairs available but these appear to have a low market presence. For the sake of argument let us guesstimate that 10-30% of wheelchair users either have a powered wheelchair or a power pack for a manual wheelchair, ie around 100-300,000 people.

If we assume that the overlap between mobility scooter users and powered wheelchair users balances out those that can use a manual wheelchair or other forms of appropriate mobility aid to 1kWheel, we have roughly ~600-900,000 users. This gives a midpoint total of ~750,000 people, or ~11% of those who need it, who are able to access a relevant mobility aid on a regular basis to 1kWheel.

4. Discussion

Even if the estimates in this short study are grossly inaccurate it is clear there is a very large gap between those that have access to a relevant mobility aid on a regular basis and those that need it, in the order of 6.2 million people or roughly 90% of those with a mobility impairment.

The market for mobility scooters is growing fast but even at 7% the total for scooters and powered wheelchairs will take over 20 years to reach half the need at 3.5 million. Anecdotally it appears that many of the groups that offer loan mobility scooters have spare capacity, ie the scooters they offer are not fully used. This runs counter to the results above but there are many possible reasons:

- Stigma: many disabled people ‘would not like to be seen in a mobility aid’
- Point of Need: this may be a local park, cafe, high street shops, friend for tea etc rather than a site of interest or a large shopping mall
- Lack of appropriate help or transport
- Mental health issues

A recent MENE survey found 2% of the total population took a visit “out of doors less than monthly” due to a physical disability [17]. This neither supports nor contradicts our findings, but points to deeper underlying issues. It is beyond the scope of this study to investigate the above.

5. Conclusion & Future Work

This short study estimates that:

- Need: Around 7 million people, or 10% of the UK population, need a significant mobility aid.
- Provision: Only around 750,000 people have access to an appropriate mobility aid

There is clearly a chasm in provision, roughly 6.2 million people, or ~90% of those who need it, do not have easy access to an appropriate form of mobility aid to exercise their rights under the Equality Act.

There has been some progress through the efforts of small and charitable groups making loan scooters available, but as their efforts appear to have spare capacity there are other issues at play. Deeper more comprehensive studies should be undertaken to verify the estimates in this report, and to understand perceptions of what is needed and where the obstacles lie, for example:

- The relationship between being 1kActive and mental health; availability of suitable helpers; low income; lack of transport etc
- What blocks people face in being 1kActive
- The degree to which people with mobility impairment(s) wish to be 1kActive
- The degree to which people with disabilities can be independently 1kActive.
- What constitutes 'Point of Need': where and when do disabled people really need wheels.
- How many potential 'wheeling miles' are lost through disability, similar to the Disability-adjusted Life Years (DALY) measure

Very much better data should be gathered, e.g. by the Office for National Statistics. The experiment with e-scooters in target towns is an interesting development, and a similar experiment with mobility scooters might be valuable in future.

There is much that national government, local government and the voluntary sector can, and hopefully will, do to improve the situation. Whatever specific actions are taken, it is likely that in the near future there will be very many more disabled people with access to wheeled mobility aids. It is therefore equally important that infrastructure in urban, rural and outdoor spaces is put in place to promote this.

Data and Matlab code for the above is available on request. Many thanks to Prof Wael El-Deredy, Universities of Manchester & Valparaiso, and John Cuthbertson of Disabled Ramblers, for comments on an early draft. Thanks also Villa Eleni, Douliana, Crete, for inspiring the finishing touches. Please send comments or queries to the author: Shail Patel, shail@disabledramblers.co.uk.

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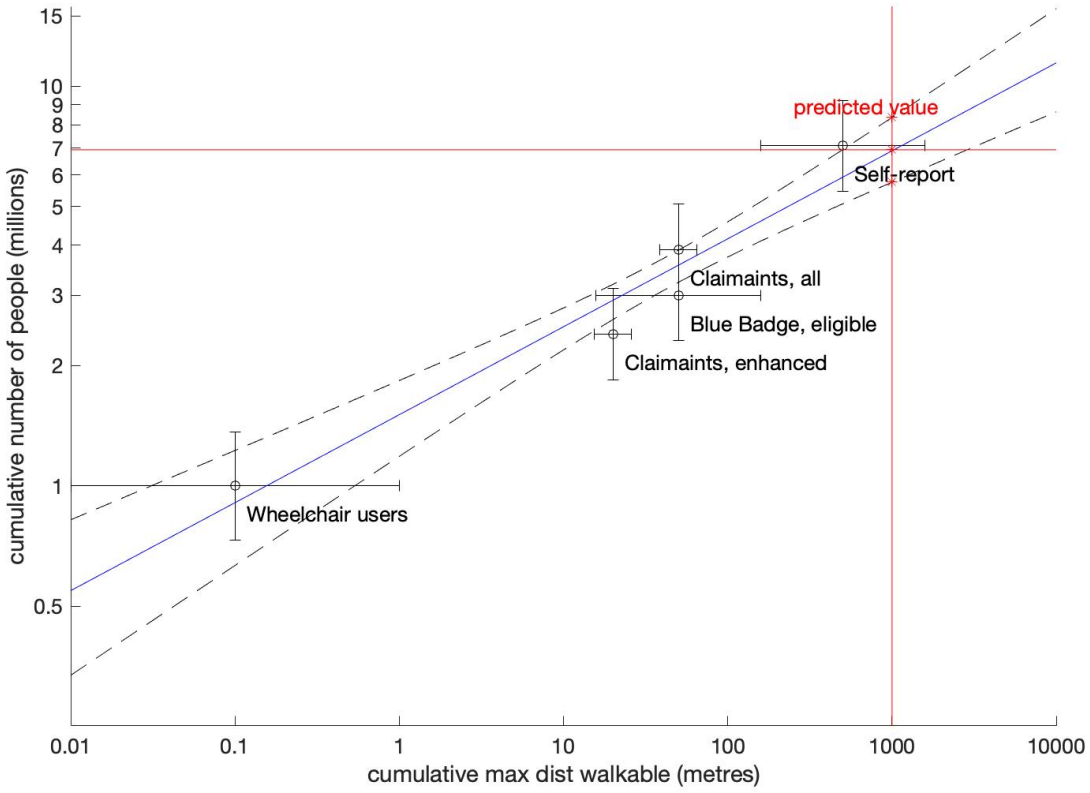

Figure 1. Log log plot of cumulative population size vs cumulative maximum distance walkable, showing predicted 7 million people that need a suitable mobility aid to be 1kActive