Utilities Stress Indicators Pilot Project
Proof of Concept

SACOSS
South Australian Council of Social Service

Summary of Presentation to the SACOSS "Working to Make Ends Meet Conference"
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Overall Project Description and Scope

The project seeks to build on the well-known indicator of housing stress (bottom two income quintiles paying more than 30% of their income for housing) to create equivalent affordability stress indicators for energy, telecommunications water and then do a pilot analysis of the numbers of households in such affordability stress.

Although there have been a few studies which have applied the concept of an affordability stress indicator to utilities, it is still a relatively uncharted area and there are no agreed definitions and benchmarks. While it is safe to use the bottom two income quintiles as the focus of concern, the benchmark for what percentage of income is the appropriate stress marker is not settled. SACOSS believes that this (and the usefulness or otherwise of the concept overall) would be best explored through an iterative process applying ideas to actual data set. Accordingly, SACOSS used household expenditure data in South Australia, but if the data is available and the concept is useful, the methodology will provide the basis for future research. In this sense, this project is probably best seen as a proof-of-concept, rather than an analysis of energy, telecommunications or water affordability.

Rationale

The rationale for developing utilities stress indicators is that, like the housing stress indicator, SACOSS believes that such indicators could provide a simple way to talk about the affordability of utilities for those in SACOSS' area of concern (low-income households) – rather than the average income household. Further, the stress indicators capture the key concept that affordability is a function of price, usage and income. This is not always well-understood in data and debates around affordability.

For instance, if we just focus on price, we miss changes in expenditure. In telecommunications, we have seen unit prices coming down markedly over the last decade but demand for data and devices has soared so the price data does not really tell us the impact on household budgets. Similarly, at least until recently, energy prices have increased markedly over the last decade, but energy usage per household has decreased steadily, with energy efficient practices, gains in appliance efficiency and the uptake of solar electricity. [1] Even without solar, the energy mix also complicates things as energy usage may be less for dual fuel households, but they may have higher energy costs overall (with double supply charges). A focus on either electricity prices or usage does not tell the story for these dual fuel households.

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[1] ABS (2020), *Energy Account, Australia,* Australian Bureau of Statistics, Canberra. https://www.abs.gov.au/statistics/industry/energy/energy-account-australia/2018-2019

Added to this are the complications of different tariff and billing arrangements which may mean that households with similar usage of any utility may face very different bills. Taken together, all these things make time series difficult and defeat (or at least further confuse) our already complex mapping of “high use, low income”, “high use, high income”, “low use, low income” etc households.

Finally, even large expenditures on energy, water or telecommunications may not matter if people’s incomes are high enough – those utilities will still be affordable. But if we just focus on income as the threshold for affordability (as is done for concession eligibility) we miss the fact that some on low incomes have no problems with affordability (e.g. homeowning pensioners with solar power), while larger families with higher incomes and inefficient housing may struggle.

By contrast, it is hoped that by bringing price, usage and income into one metric, the stress indicators can provide a simpler yet more nuanced framework, so that we can say that X number of households are in water, energy stress or telecommunications stress (i.e. struggling with utilities affordability). This indicator is not technology dependent, and we should be able to track changes over time to see if more or fewer households are now in water, energy or telecommunications stress than 5 or 10 years ago.

Further, by comparing the overlaps (or not) between the stress indicators, the data may also help identify the extent to which affordability issues relate to the particular commodity or simply to lack of income.

Finally, the stress indicators may provide an additional tool for identifying households likely to have difficulty in paying bills. This will need to be tested empirically in the project (by comparing our data with the ABS data on difficulty in paying bills), but may also have implications for concessions and support targeting by identifying the number of households who are in receipt of energy concessions but are not in energy stress, as well as households who are in energy stress who are missing out on concessions. State by state comparisons may also be useful for understanding the impact of jurisdictional based policies and regulations.

It should be noted that the stress indicators are different to ideas of energy or telecommunications poverty (which we critiqued in the waged poor energy report) and hopefully have the advantage of not getting bogged down in debates around the definition or language of poverty. That said, the stress indicators still rely on a level of arbitrariness in setting the benchmark of stress (the percent of income) or indeed limiting it to the bottom two income quintiles (as the 40 percent mark is just an arbitrary point on an income continuum). However, as most postmodern analysis emphasises, the same is true of any indicator from foundational economic statistics like Gross Domestic Product to the eligibility criteria for concessions. Indeed, it is the nature of knowledge that definitions and understandings always rely on some arbitrary point where a line is drawn between what “is” and what “is not”. This is does not make such line drawing wrong, simply contestable. And it poses the question not whether something is “right”, but whether it is usable – and for who?

The final caveat is that, while SACOSS believes that the stress indicators are worth exploring, they are not a panacea and do not capture or explain everything about affordability. One example is that the stress indicators rely on actual expenditure, but households may limit expenditure by depriving themselves of those services – for instance, a household sharing a mobile phone and using it to hotspot rather than pay for nbn may have a low telecommunications expenditure and not be in stress, but only because they are not getting the services they actually need. This would also apply to many measures of affordability, but the broader point is that no single measure can capture the complexities of each individual household's circumstances, and nor is there a policy or service response that automatically comes from identifying that a household is in utilities stress.

The utilities stress indicators we are looking at are simply a tool to capture some key aspects of affordability, and whether this tool is useful for developing responses is one of the tests that this pilot project set out to examine.

Thresholds and Data

Thresholds

As noted above, the thresholds for such stress indicators are obviously arbitrary and endlessly debateable, and the table below summarises the thresholds used in previous studies.

Table 1: Affordability Thresholds in Other Studies

	Energy	Water	Telco	
	% of Household Income			Income Base
Various International	10	3		Various
Astrolabe - UNSW	6	3	5	HDI
Chan - PhD	10	3		AHHDI
Double HES average	4.8	3.2	5.5	HDI
SACOSS	**6**	**3**	**5**	**HDI**

The various international studies in the first line is a rough median of a range of reports from the World Health Organisation, the World Bank and the Asian Development Bank, although these studies tend to be over 10 years old and there are inevitable difficulties in applying benchmarks in very different economies. The studies also use different income bases, and as we will see, the choice between gross income, disposable income or after-housing income is important. The paper by the UNSW Astrolabe Group (2019)[2] was part of Infrastructure Australia's Infrastructure Audit and is probably the most useful Australian study, although the PhD from Wai Wah Chan (2015) provides a comprehensive literature review and theoretical discussion (as well as data – although not for telecommunications).

[2] This report tracks average quintile expenditure against these benchmarks, but not the numbers of households exceeding the benchmarks. It also includes transport, and when transport is included, SA household utilities/infrastructure bill is lowest in Australia (but not for lowest income quintile).

The line titled "double HES average" is included for context as the housing stress benchmark of 30% is approximately double the housing expenditure in the ABS Household Expenditure Survey.[3] This is important in terms of ensuring a broad comparability to the housing stress indicator so that we were not capturing too many or too few households and therefore exaggerating or underplaying utilities stress by comparison with housing stress. However, for the bottom line, which was the starting values we used for testing in this pilot project, we used a higher energy threshold – in part to align with the Astrolabe study, and partly because the energy averages are dragged down overall by the number of households with solar. (Averages only really work where all households have some similar expenditure). We also ran the numbers different threshold values around these levels to check the robustness and proportionality, and these thresholds seemed the most reasonable.

SACOSS also considered combining the thresholds to calculate an overall Utilities Stress Indicator (14%) and a Housing and Utilities Stress Indicator (45%). However, for reasons which will be discussed later, this proved to be flawed (at least in that format).

Data

The data chosen for the pilot study was the 2015-16 ABS Household Expenditure Survey (HES) data for South Australia (ABS, 2017). This is the most recent release of the HES and although it is obviously now dated, it is still usable because the goal was to prove the concept, not necessarily to come up with definitive affordability data. Further, while the data is old and irregularly collected, the HES data is the most authoritative expenditure data in Australia and crucially, it enables comparisons across different utilities within the one data set. While the AER, for instance, has comprehensive energy expenditure data, it can't be used to compare with water or telecommunications, although that is not to say that that data could not be used to identify households in energy stress. Indeed, if the concept of stress indicators proves, it may be that different (more regular data sets are used) and benchmarked periodically to the HES data. However, for the purposes of developing the concepts, the authoritative HES data has been used.

That said, there are a few caveats in that, for resourcing reasons we only tested the pilot on the summary-level HES data. In practice this means that we use "communications" expenditure, which includes postage, rather than telecommunications (which is a sub-category). However, the ABS telecommunications subcategory does not include some technology expenditure which we would regard as telecommunications and SACOSS' previous work (Ogle, 2017) has shown that when this is included the actual expenditure is about the same as the summary level Communications. Accordingly, the use of the summary category for the pilot study should not make a difference in terms of the proof of concept.

Similarly, the water expenditure used is the ABS category "Weekly Water Rates" which may not capture some expenditure – most notably when water costs are included in other

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[3] SACOSS calculates that in the 2015-16 Household Expenditure Survey, the average "Current Housing Costs" were 16.3% of household disposable income, and 15% of HDI when calculating rent and mortgage costs (capital and current) (ABS, 2017).

expenditures such as rent or council rates. In that sense, the ABS data under-states water expenditure.

A more nuanced analysis with more precise data would be possible at a later date, but the first priority was to prove the concept and see if it was worthwhile.

Against this background, SACOSS did the calculations from the ABS HES data. Again, the data set was limited to South Australia, and the bottom two income quintiles. The bottom two quintiles were based on equivalised income, but after that selection, all expenditure figures were gross expenditures for those households (including housing costs). Households with zero or negative incomes were removed from the sample, as is common practice in poverty and income inequality analysis (see for instance, Bradbury, 2018), leaving a total of 594,525 households in the sample.

First Round Findings

The table below shows the numbers of households in the various utilities stress in South Australia, based on the thresholds noted above.

Table 2: Households in Stress - First Run

	No. of Households	% of All H/holds
Energy (6% of HDI)	92,905	15.6%
Telco (5% of HDI)	78,060	13.1%
Water (3% of HDI)	47,064	7.9%

Clearly there were a large number of households in various forms of utilities stress in South Australia at the time of the survey, with 16% of low-income households in energy stress, 13% in telecommunications stress and 8% in water stress. As we will see later, these are not all the same households, and curiously the numbers are larger than the numbers in housing stress – which was 11.6% in the same HES data set. This may suggest that the utilities thresholds were set a little high, but of greater concern was that on reflection we believe the initial methodology used may have yielded some perverse results.

Perverse Results

Any data that relies on drawing lines at particular points on a continuum is likely to contain anomalies around the boundaries, and there is no doubt that those households either side of a dividing line (whether it be an income quintile, a poverty line or a stress threshold) are likely to have more in common with each other than with other households on "their" side of the line but at greater distance on the continuum. However, system design should try to keep these anomalies to a minimum, and not produce results which are counter-intuitive. To test this, SACOSS worked through some hypothetical examples using telecommunications expenditure for three households. The household data is set out in the table below, and with a stress threshold of 5% of household disposable income, only household 2 is in telecommunications stress.

Table 3: Telecommunications for 3 Hypothetical Households

	Household 1	Household 2	Household 3
Income ($pw)	$1,000	$1,000	$500
Telco Bill ($pw)	$40	$55	$12
Telco % of Income	4%	5.5%	2.4%
Stress?	No	Yes	No

This seems straightforward, but if the households have markedly different housing costs, then the amount of money available for utilities expenditure and the extent to which they might struggle with affordability is also radically different. This obviously could apply to a range of other expenditures, but housing is so important (on average the largest household expenditure), so inflexible, and so uneven between different households that it has a large and unique impact on the affordability of most other household services. The table below shows the same hypothetical households with different housing costs factored in and telecommunications expenditure calculated as a percent of after-housing income.

Table 4: Telecommunications Expenditure for 3 Households, After Housing Costs

	Household 1	Household 2	Household 3
Income ($pw)	$1,000	$1,000	$500
Telco Bill ($pw)	$40	$55	$12
Telco % of Income	4%	5.5%	2.4%
Stress?	No	Yes	No
Housing Cost ($pw)	$400	$0	$300
Telco % A/H income	6.6%	5.5%	6.0%

What is apparent from the bottom line is that while Household 2 was the only household identified as being in telecommunications stress in the first run, when housing costs are factored in, it spends proportionately less of its after-housing income on telecommunications than the other two. Telecommunications are probably *least* affordable for Households 1 and 3, despite having a lower telecommunications expenditure because they spend proportionately more of their available (after-housing) income on it. Yet in the original model, they are not seen as being in telecommunications stress, while Household 2 is in stress. The stress indicator would not seem useful in identifying stress in these examples.

One solution would be to simply apply the 5% benchmark to after-housing income. In that case, all three households would be in telecommunications stress, which is problematic for a couple of reasons. Firstly, it would greatly increase the numbers in stress and potentially diminish the focus on those struggling the most. Secondly, it may introduce a further perverse outcome evident in relation to Household 3 in that, despite spending 6% of their after-housing income on telecommunications, it is not clear that a household spending only $12 a week (2.4% of their income) on telecommunications should really be viewed as being

in *telecommunications* stress. The real problem for Household 3 is housing costs accounting for 60% of their income. Put simply, they have a housing affordability problem, not a telecommunications affordability issue. At a policy level, whatever we do in the telecommunications area to assist with affordability is probably not going to help much unless those housing costs (or their income) can be addressed.

In short, what we see from these three examples is that if we use before-housing income, then the only household in telecommunications stress (Household 2) is the one which probably will have least problems paying their telecommunications bill. But if we use after-housing income, then all will be in stress – including Household 3 that has minimal telecommunications expenditure.

Revised Findings

In response to these issues, SACOSS changed the stress thresholds to factor in the impacts of housing costs and then applied these new thresholds to after-housing disposable income. The adjustment was based on the housing stress indicator in that we increased each utility stress threshold by 30% (then rounded the number). In some ways, this would take account of lack of housing costs for those without such costs by making the utility stress benchmark higher, while also requiring higher utility expenditures for those (like hypothetical Household 3) with high household costs and low utility expenditure. The utility stress expenditure benchmark is also higher for those with significant housing costs, but it is a higher proportion of a much lower (after-housing) income base.

Adopting this method, the new thresholds, as a percent of *after-housing* income are:

- Energy = 8%
- Telecommunications = 6.5%
- Water = 4%

Again, the amount of change and new thresholds are somewhat arbitrary, but we believe that they are closer to a real context of affordability challenges than the before-housing data. This is evident when we look back at the hypothetical household. All the figures in the table below are the same as before, but with the new stress benchmark only Household 1 is in telecommunication stress – spending above 6.5% of after-housing income on telecommunications. This is as it should be as Household 1 spends the highest proportion of its after-housing income on telecommunications and is therefore likely to struggle more than the other households. By contrast, Household 2 is not in stress because its lack of housing costs makes telecommunications easier to afford, and Household 3 is not in telecommunications stress because, as argued earlier, its predominant problem is housing not telecommunications.

Table 5: After-housing Telecommunication Stress

	Household 1	Household 2	Household 3
Income ($pw)	$1,000	$1,000	$500
Telco Bill ($pw)	$40	$55	$12
Telco % of Income	4%	5.5%	2.4%
Stress?	No	Yes	No
Housing Cost ($pw)	$400	$0	$300
Telco % A/H income	6.6%	5.5%	6.0%
Revised Stress?	Yes	No	No

With the revised stress thresholds, we ran the calculations again to identify the numbers of households in energy, telecommunications or water stress. As the table below shows, the numbers are of a reasonably similar order of magnitude as the before-housing-costs numbers, but with fewer households in relation to energy and water stress. Importantly, as our hypothetical examples show, in some cases they may be different households – and, we would argue, more likely to be the ones facing the most difficult affordability challenges.

Table 6: Households in Stress, Revised Indicators

	Original Numbers		Revised	
	No. of H/holds	% of All H/holds	**No. of H/holds**	**% of All H/holds**
Energy	92,905	15.6%	**83,182**	**14%**
Telco	78,060	13.1%	**78,908**	**13.3%**
Water	47,064	7.9%	**37,751**	**6.3%**

Beyond the interest in before and after housing cost numbers, in real terms it is again clear that we are talking about a significant number of households in affordability stress for each utility. And what was particularly interesting is that when we did the comparison, they are not the same households in each utility category. The table below shows the percent of households that are in stress in one utility that are also in stress for another utility. For instance, the top line shows that of the households that are in energy stress, 30.5% are also in water stress, and 50% are in telecommunications stress. Put differently, half the households in energy stress are not in telecommunications stress, and two-thirds are not in water stress.

Table 7: Cross-over Between Stress Indicators

	Energy Stress	Water Stress	Telco Stress
Energy Stress	-	30.5%	50.2%
Water Stress	67.3%	-	49.5%
Telco Stress	52.9%	23.7%	-

These cross-over numbers are higher than when we did the same exercise for the before-housing data, but generally lower than we first anticipated. This suggest that the affordability challenges are not simply about income and there are things about the particular utility in the particular household that underlies higher expenditure in that area than across all utilities. That said, we note the cross-over numbers are higher for water, which is the lowest expenditure and may suggest that a greater proportion of water stress is simply income-driven.

It was these findings which led us to abandon the idea of a cumulative Utilities Stress Indicator as the sum of all the stress indicators (which would be 18.5% of after-housing income). With such a large proportion of households experiencing stress in relation to only one utility, or possibly two, it makes little sense to sum the numbers. A household spending 12% of income on energy, but only 4% on telecommunications and 3% on water is not really in utility stress in general (although they are over the 18.5% threshold) – they are in energy stress. Similarly, given the lack of cross-over, if we cut out all the households under the threshold that spend say 12% of after-housing income on energy, but only 3% on telecommunications and 2% on water, then the numbers in total utility stress may not be very high (or simply be a product of very low incomes) even though those households clearly have some degree of utility stress by virtue of their energy expenditure.

In this context it is not clear what the number in total utility stress actually tells us, and perhaps a better way to think about overall utility stress would be to count the number of households in stress in any of the three categories. In this sense, the number of households in utility stress would be the 83,182 households in energy stress, plus 47.1% of the 78,908 houses in telecommunication stress (i.e. those in telecommunications stress but not in energy stress), plus whatever proportion of those in water stress that are not in either telecommunications or energy stress. However, SACOSS has not done that calculation, partly because the issues only emerged late in the process, and partly because it is still unclear what value a combined stress indicator adds for utility-specific policy responses.

Of perhaps more interest is the comparison with the data within the ABS Household Expenditure Survey of the numbers of households who, in the 12 months prior to the survey, had an instance of not being able to pay a gas/electricity or telephone bill on time for financial reasons (ABS, 2017). This is one of a suite of financial stress indicators in the HES, and the table below shows the number and proportion of households in each stress category that could not pay a bill. Thus, in the first line, of the 83,182 households in energy stress, 22,905 or 27.5% of them had an instance of not being able to pay a bill on time.

Table 8: Stress Indicators and Ability to Pay Bills

	Could not pay gas/electricity/telephone bill on time	Total h/holds	%
Energy Stress	22,905	83,182	27.5
Water Stress	7,398	37,751	19.6
Telco Stress	22,879	78,908	29.0
All Households (SA)	74,893	594,525	12.6%

Looking at the numbers in the last column for the three utility stress categories, we initially expected them to be higher, that is, we expected far more households in stress to have been unable to pay a bill. At one level this reflects the data which has come out of SACOSS qualitative work on energy and telecommunications (https://www.sacoss.org.au/waged-poverty) which shows the extent to which low-income households prioritise the payment of these bills and will go without other things (including food) to pay the bills.

However, looking at the bottom line of the table is also crucial because it shows that 12.6% of all households in South Australia had an experience of not being able to afford a bill, far lower than the proportion of those households who were in stress. It might be suggested that this is simply because the other households on average had higher incomes, but in the published ABS data for the bottom two income quintiles the figure of not paying a bill was only 14%, slightly higher than the average of all households (ABS, 2017). This was still well below the proportion in the households identified as being in stress. In fact, *what the data shows is that those households identified by our indicator as being in energy or telecommunications stress were more than twice as likely as to been unable to pay a bill as other households in the lowest income quintiles. (Those in water stress were around one-third more likely to have been unable to pay a bill).*

In some ways this should be obvious: households with low incomes and high utility expenditure are more likely than other households to have trouble paying. However, the fact that this is reflected so starkly in the stress indicator means (for us at least) that the indicators work as they should in terms of identifying affordability pressures. This is not to say that they could not be refined, but it does suggest that the concept may be viable.

Where to Now?

When the results above were presented to the "Working to Make Ends Meet Conference" in December 2020, SACOSS indicated that it was seeking partners and funding to take the stress indicators concept further, and that the direction of future work would in part be set by the needs and ideas of partners and how they want to utilise the concept or data.

This remains the case, but just in terms of developing the indicators further there are some clear research directions, namely to:

- Repeat the data analysis with more nuanced HES micro-data (calculating telecommunications rather than communications expenditure)
- Do the data analysis at the national level to have a bigger and more robust data set, and by state to enable state comparisons
- Do demographic analysis of households in stress to identify any patterns in household composition, tenure, source of income, location, etc
- Construct a time series (hopefully with 4 points from 1998-99 up to 2015-16) and ready for the next HES so we can see if affordability is getting better or worse (that is, if the number of households in stress has increased or decreased over time).

Given the results of our proof-of-concept, and potentially with the addition of the above data, SACOSS believes that there are a range of potential applications and other avenues of exploration using the stress indicator concept.

Firstly, the concept could be used in and form part of other data on affordability. For instance, Telstra's Digital Inclusion Index is an important source of data on telecommunications affordability and could produce stress indicator data alongside its other measures. Relative expenditure is already part of the index, but using that data to calculate numbers of households in stress value-adds to the data-use and would help fill in the gaps left in the 6-year ABS HES data cycle. Again, while we have used the HES data, the concept is applicable to any data set that captures income and expenditure on one or more utility – and as noted earlier, could be used to cut through some of the problems in tracking affordability over time with changing technologies.

In this context, another potential development would be for energy, water and telecommunications retailers apply the stress measures to customers in their hardship programs and those in payment difficulties. This could test whether the stress indicators were useful in identifying hardship or potential hardship, and ensure that solutions like payment plans were actually affordable and not a cause of ongoing stress.

SACOSS also believes that the stress indicators could be useful in a range of policy development and advocacy. Most obviously, there is an implication for concession reform. South Australia and most other jurisdictions have eligibility criteria for energy and water concessions based on income alone. This leads to poor targeting of concessions, and the data above suggests that the stress indicators are much better indicators of those who need support. Moreover, in the absence of a real telecommunications concession (or the early stages of development of one), the numbers of households in telecommunications stress may be a useful indicator of the required scale and targeting of any concession.

However, these are just the preliminary ideas and discussions within SACOSS. The goal of the pilot project was to show what energy, water and stress indicators look like in practice in the hope that, if others found the concept useful, they would think about how they could be applied to their own areas of work – be that in industry, consumer advocacy, or government or regulator policy development.

SACOSS remains interested in working further on these ideas and welcomes questions, critique or proposals for joint work to develop the project further.

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