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VCOSS  
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of Social Service

# Future Social Services Institute

## Visualising the Victorian Care Sector

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# **Executive Summary**

## **Acknowledgement**

## **Declaration of Originality**

## **Glossary**

## **Student Contributions**

Both student members of the project development team have contributed to the project equally.

<b>Section</b>	<b>Contributing Students</b>
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2 Brief Literature Review, 2.1 Transformation of the Social Services Sector	Ben Cole
2.2 Data Visualisations in the Social Care Sector	Xuejiao Zhou
3 Objectives	Xuejiao Zhou
4 Proposed Methodology, 4.1 Digital Report, 4.2 Visualisation Platform, 4.3 Stakeholder Engagement Workshops	Ben Cole
5 Project Design, 5.1 Timeline	Xuejiao Zhou
5.2 Collaboration Plan	Ben Cole
6 References	Xuejiao Zhou and Ben Cole
7 Appendices	Xuejiao Zhou and Ben Cole

# 1 Introduction

The Future Social Services Institute (hereon FSSI) has been established cooperatively between the Victorian state government, the Victorian Council of Social Service (VCOSS), and the Royal Melbourne Institute of Technology (RMIT). The objectives of FSSI are wide-reaching, including (but not limited to) designing educational programs, assisting in workplace training, researching reforms for the social services sector, and supporting transformation in not-for-profit organisations. (Glanz, 2016)

There are numerous industries involved in social services, and these industries can differ between countries and cultures. As this project focuses on the social services in Victoria - and more broadly Australia - the Australian federal government website for the Department of Social Services includes the following sectors:

- Communities and Vulnerable People
- Disability and Carers
- Families and Children
- Housing Support
- Mental Health
- Seniors
- Women's Safety
- Working Age
- Welfare Reform

(Department of Social Services, 2019)

In the Victorian government specifically, social services are bundled together with health, but include services operating in areas such as:

- Ageing
- Alcohol and drugs
- Children and families
- Disability
- Housing and homelessness
- Mental health

(Department of Health and Social Services, 2019)

More broadly, the Australian Association of Social Workers supports the definition of social work as laid out by the International Federation of Social Workers that:

*Social work is a practice-based profession and an academic discipline that promotes social change and development, social cohesion, and the empowerment and liberation of people. Principles of social justice, human rights, collective responsibility and respect for diversities are central to social work. Underpinned by theories of social work, social sciences, humanities and indigenous knowledge, social work engages people and structures to address life challenges and enhance wellbeing.*

- International Federation of Social Workers,  
July 2014

Whilst definitions for which industries comprise social services, the reasons for establishing FSSI and their data needs are much clearer.

## 1.1 Background

### 1.1.1 An Ageing Population

According to the Australian Institute of Health and Welfare, the number of Australians aged 65 and over has been increasing steadily since 1927. In 2017, the total number of Australians over the age of 65 made up 15% of Australia's total population, with this proportion only projected to grow over the coming years. (Australian Institute of Health and Welfare, 2018)

Considering Australia's aged population is predicted to increase, it's reasonable to assume that the number of persons in aged care will increase as well.

### **1.1.2 Royal Commission into Aged Care Quality and Safety**

Numerous scandals were reported in Australian news services regarding the care of residents in aged care facilities between 2015 and 2018, particularly in South Australia. In response to an ABC News Four Corners investigation in 2018, Prime Minister Scott Morrison announced a Royal Commission into Aged Care Quality and Safety. (Hutchens, 2018)

The terms of reference can be viewed on the Royal Commission's government website, and cover 6 main objectives for investigation:

- whether aged care is being provided adequately
- specifically, how to provide the best care to younger persons with disability in aged care and persons with dementia
- what challenges the aged care sector will face with changing demographics and in rural & regional areas
- what can be done to improve aged care provision
- how to improve the autonomy and independence for patients in care
- sustainability and modernisation of aged care provision
- as well as any other matters related to the above terms

(Royal Commission into Aged Care Quality and Safety, 2018)

### **1.1.3 NDIS**

First legislated in 2013, the National Disability Insurance Scheme (hereon NDIS) was established to achieve several objectives, but primarily to supply funding given to the provision of disability care (*National Disability Insurance Scheme Act, 2013*). Furthermore, the NDIS also encompasses regulation and reformation of disability care services in Australia. This funding amounts to AU\$22 billion per year, which covers half a million Australians with a permanent and significant disability who are younger than

65 years old. This care isn't solely of a medical nature, and can also include services that address emotional health, fitness, education, opportunities to socialise, and more. (National Disability Insurance Scheme, 2020)

### **1.1.4 Disability Royal Commission**

Similar to the Royal Commission into Aged Care Quality and Safety, a separate Royal Commission was established in 2019 to investigate Violence, Abuse, Neglect, and Exploitation of People with Disability (Prime Minister of Australia, 2019). One of the leading causes for this Royal Commission was a report that detailed allegations of abuse and corruption at a Victorian non-profit provider of care for persons with disability (McKenzie & Baker, 2014). However, this was just one example of such allegations, with the Royal Commission hearing that persons with disability in the care of hospitals were vulnerable to misdiagnoses, medication errors, and generally poor understanding of intellectual disability (Brown, 2020).

### **1.1.5 Charitable Organisations**

The Australian Charities and Not-for-Profit Commission (ACNC) (2019) reported over 57,500 total charities operating or registered within Australia in the year 2017. Australian charities included in the ACNC report recorded 1.26 million employees in paid positions, and 3.3 million volunteer roles. Of those more than 57,500 charities, 10.9% were found to be operating within the social services sector. Furthermore, the ACNC reported that 20.5% of these charities were based in Victoria. Charities make a sizeable contribution to Australia's workforce and an equally important contribution to the delivery of social services.

## **1.2 Significance**

The social services sector is clearly going to change considerably in the next few years, which the FSSI cite as one of the primary reasons for their being established. The FSSI is

choosing to focus on 3 pillars of support to the social services sector; growth, quality, and adaption. Data collected by the ACNC will assist FSSI in assessing how the Victorian social services sector will grow over time, how the quality of its services can be maintained and improved, and how best to both adapt to and inspire the changes that will occur in the future.

## 2 Literature Review

### 2.1 Transformation in the Social Services Sector

Kyle et al (2018) identified a number of indicators and predictors for the transformation occurring in the social services sector, as well as the challenges facing the industry. Chiefly among these were that there are many women currently working in care roles that are unpaid and unemployed (United Nations, 2015). Kyle et al (2018) also found that young and less educated persons faced greater difficulties in finding employment in paid roles. Further to this, wage growth has not kept up with rising productivity in social services or salary increases in other sectors, effectively resulting in pay decreases for the social services sector (Dew et al, 2016). This is coupled with an ageing workforce that is exiting the industry, showing real strain on staffing expected for the social services sector both presently and in the coming years (McKinsey Global Institute, 2017).

Combined with the expected ageing population stated above, the social services sector needs to embark on rapid change in order to minimise the strain it will endure in the coming years.

### 2.2 Data Visualisations in the Social Care Sector

In an age of “*big data*”, it is essential that digital transformation be undertaken across social service sectors. Karaniasios (2018) demonstrates that data and analytics can be considered as important as labour and capital for modern organisations. Community services sectors should value big

data and analytics as currently maintained by many commercial organisations. Young and Wessnitzer (2016) state that a good exploratory data analysis begins with the ability to describe and plot a data set. Thus, visualisations are an effective method for reviewing the data and can provide valuable insights into large data sources.

Visualisation techniques are used to present big data in the form of tables, charts and graphics. It is believed by experts that representing data visually makes it possible to communicate data effectively and gives people the opportunity to analyse and examine various datasets which would otherwise be difficult to understand (Kennedy & Allen 2017). However, not all visualisation tools are useful in analysing large datasets or databases. For example, Tableau is a powerful popularly used visualisation tool but often struggles with complex and large datasets.

A good visualisation tool is able to explore data interactively and also assure the interaction quality of users with data visualisation (Berinato 2016). Tool designers should consider whether the user is able to adjust properties with the tool's interface, explore relationships between attributes of their choice and look for links between different data (Polack 2019).

## 3 Objectives

The objective for this project as defined by primary stakeholder FSSI is to develop an interactive data visualisation tool that explores trends and changes between ACNC datasets for different years. Stakeholders engagement determined the data visualisation tool would be used to answer several guiding questions as laid out in Appendix 1. Consultation sessions with FSSI further defined this objective to be explored using a web-based document that allows for interactive visualisations.

## 4 Methodology

### 4.1 Data Source

The 2016 ACNC data set had already been accessed by VCOSS and cleaned to their standards, and was supplied. The 2017 ACNC data was then cleaned for this project to VCOSS standards to ensure consistency between years. There is scope for this project to be updated with datasets from more recent years once they have been released.

#### 4.1.1 Data Cleaning

As the 2016 data was pre-prepared by VCOSS, no cleaning was performed on it prior to use in the project besides identifying and removing invalid ABNs (see below). The 2017 ACNC dataset was sourced directly from the [data.gov.au website](#) and was cleaned to VCOSS standards. Please see Appendix 2 for further details on how the 2017 dataset was cleaned.

Hereon the ACNC datasets cleaned to VCOSS standards will be denoted as VCOSS ACNC {year} Data, or words to that effect.

##### 4.1.1.1 Merging Aged Care Activities and Social Services

**4.1.1.2 Removing Invalid ABNs** Exploration of the data by the development team revealed there to be invalid ABNs in the 2016 VCOSS ACNC dataset. Referring to the [Australian Business Register website](#), the development team wrote a short block of code to run through all ABNs in the VCOSS ACNC datasets and identify valid or invalid ABN numbers. It was found that most of the entries in the data with invalid ABNs were tied to ACNC reporting groups, which is explained on the [ACNC website](#). Any ABN found to be invalid resulted in the entire entry being removed from the datasets before further use in visualisations and analysis. Please see Appendix 3 for a code snippet on how these ABNs were identified.

### 4.2 Digital Report

This project is centred on data that has already been collected by the ACNC and cleaned to standards established by VCOSS. Once the appropriate data was defined via discussion with stakeholders, a digital report summarising key findings from the VCOSS ACNC 2016 and 2017 datasets was compiled. The report combined interactive data visualisations with industry insights, and was prepared as a .html file with R packages ggplot2 and plotly used for visualisations as required. Please see figure 1 for an example of an interactive plotly chart build with the VCOSS ACNC 2016 and 2017 datasets.



Figure 1: A Plotly interactive plot using the ACNC dataset to visualise funding sources for each main activity

### 4.3 Stakeholder Engagement

During project planning meetings, FSSI stakeholders suggested following a co-design process to engage key contributors from both FSSI and VCOSS throughout the development stages to ensure the project was fit for purpose at all stages of development. Meetings with stakeholders in FSSI and VCOSS were held weekly during the development of the project, which addressed both design considerations as well as extra insight into the data offered from an industry perspective.

## 5 Results

### 5.1 Social Services Sector Size

Charities operating in the social services sector comprise more than one out of every five charities operating in Victoria. In 2016 this was 1,062 charities, which decreased slightly in 2017 to 1,022 (22.8% and 22.0% of total charities, respectively). Number of charities in other sectors were increased from 3,606 in 2016 to 3,629 in 2017.

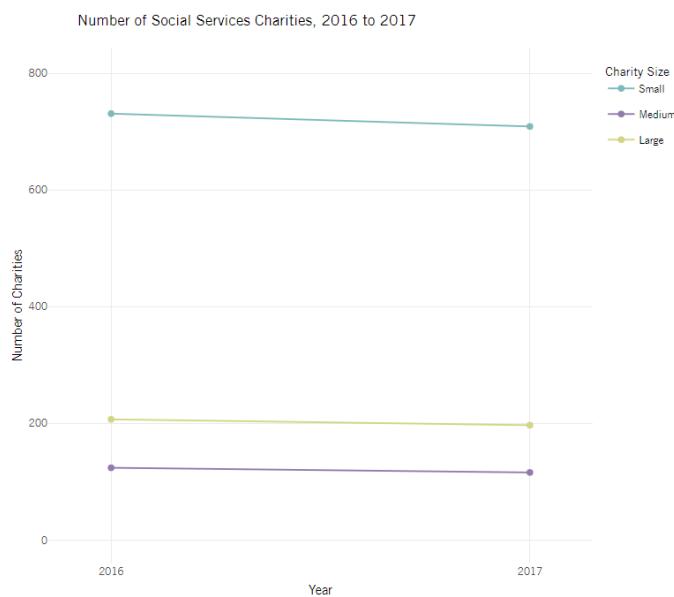


Figure 2: Count of Social Services Charities by Charity Size

The majority of Victoria's social service charities were small charities (731 charities in 2016, 709 in 2017), followed by large charities (207 in 2016, 197 in 2017) and medium-size charities (124 in 2016 and 116 in 2017).

Figure 3 shows that most community service organisations (including social service charities) had no change or slight decrease in numbers. Only other education organizations and economic, social and community development organizations had a growth from 2016 to 2017.

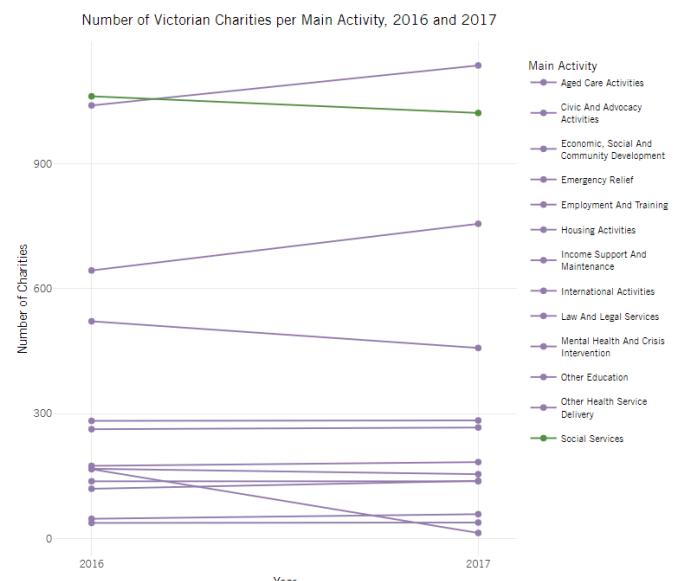


Figure 3: Count of Victorian Charities per Main Activity

### 5.2 Workforce Composition

The charitable services sector is a large and growing employer. Analysis of the ACNC 2016-2017 data show that Victorian social service industry employed 35,296 people in 2016 and this figure was increased to 43,697 in 2017.

From 2016 to 2017, the dominant staff type in social service sector was changed from part-time to full-time. The number of casual staff was the smallest in 2016 and 2017 compared with other staff types. A slight decrease in number of casual employees was seen in the period of 2016 to 2017; from 8,258 to 8,222 respectively. There were changes in the number of part-time employees and the number of full-time employees as well. The number of part-time employees decreased from 15,220 to 14,570 and the number of full-time employees was increased from 11,818 to 20,905.

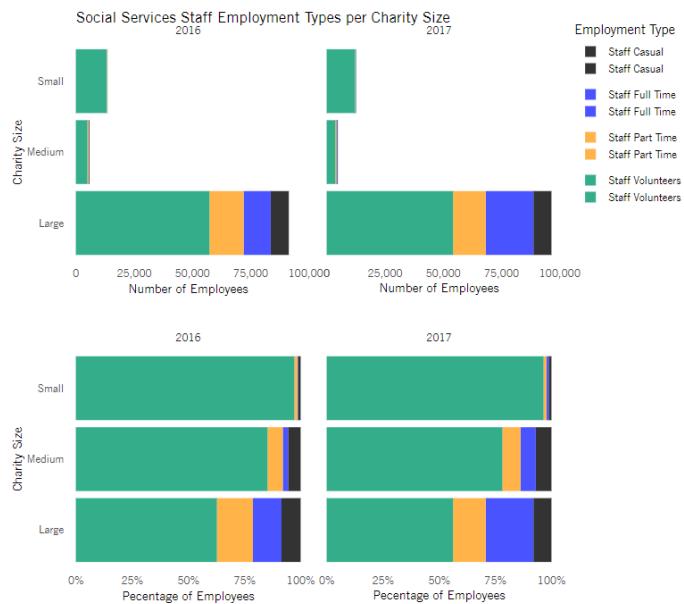


Figure 4: Number of Workers in the Social Services Industry by Organisation Size and Employment Status

Large charities employed around 96% of social services industry workers in Victoria in 2016 and 2017. This comprised:

- 11,635 and 20,456 full-time workers (34.2% and 48.5%)
- 14,644 and 14,014 part-time workers (43% and 33.2%)
- 7,773 and 7,734 casual workers (22.8% and 18.3%)

Medium-size charities employed around 2.4% of the total social service industry workforce in 2016 and 2017. The medium-size charity workforce comprised:

- 139 and 325 full-time workers (16.1% and 31.1%)
- 398 and 387 part-time workers (45.1% and 37%)
- 326 and 334 casual workers (37.8% and 31.9%)

Small charities employed around 1% of the total social service industry workforce in 2016 and 2017. The small charity workforce comprised:

- 44 and 124 full-time workers (11.5% and 27.7%)
- 178 and 169 part-time workers (46.7% and 37.8%)

- 326 and 334 casual workers (41.7% and 34.4%)

The vast majority of Victorian Social services industry charities are supported by unpaid volunteer worker. Volunteer workers accounts for 68.2% of the total social service industry workforce in 2016 and was decreased slightly to 61.7%.

Small charities of social service sectors rely the most on volunteers (97.2% in 2016, 96.5% in 2017) followed by medium (85.3% and 78.2%) and large charities (62.7% and 56.3%).

In other community service sectors, Civic and advocacy activities had the most volunteers in 2016 but had a huge drop from 77403 to 620 in 2017. In 2017, other education sectors got the highest numbers of volunteers. Social services were in the second place in both years and had a slightly decreasing from 75,605 to 70,289 people.

### 5.3 Sector Funding

The Victorian social services industry collectively received an income of around \$3 billion in 2016 and \$2.3 billion in 2017 with around 60% these generated from government grants.

Social services industry received the most in government grants (\$2.1bn and \$1.97bn) in 2016 and 2017, with other health service delivery second (\$1.6bn) in 2016 and aged care service delivery second (\$1.5bn) in 2017. International activities raised the most from donations and bequests (\$513m and \$438m).

Figure 5 shows government grants are the single biggest source of income for Victorian social service charities. All other income and revenue combined raised nearly \$650m for social service charities but the amount was decreased substantially to \$180m by 2017, while donations and bequests raised over \$200m in each year.

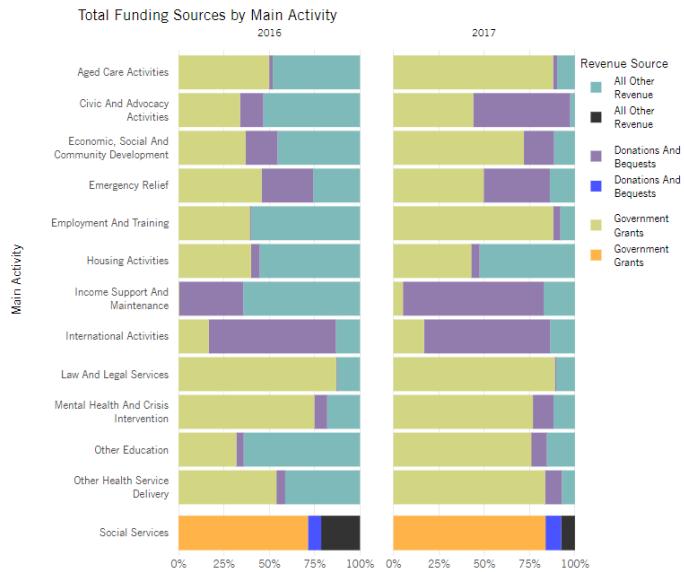


Figure 5: Proportion of Funding Sources per Main Activity

Large social service charities received most money from government grants, which was around \$2 billion. Income from donations and bequests decreased from \$200m to \$184m while other income and revenue received decreased from \$600m to \$158m in 2016-2017.

Medium-sized social service charities raised \$14m in other income and revenue in 2017, a decrease from the previous year. They also raised around \$10m in donations and bequests, a slight decrease from the previous year. Reported income from government grants was \$17m, which was a slight decrease from 2016.

Small social service charities received just around \$5m in other income and revenue, little change from 2016. They also raised \$7.3m from donations and bequests, a slight increase from \$7.1m in the previous year. Small social service charities also received around \$3.9m from government grants, almost the same as the previous year.

#### 5.4 Financial Health of Sector

The financial health of social service charities affects their ability to deliver vital services to people facing disadvantage. Figure 6 shows the majority of Victorian social service

charities (539 in 2016 and 537 in 2017) were in budget surplus. 82 social service charities operated a balanced budget in 2017 and this is a decrease on the number of charities from the previous year. 403 charities were in deficit in 2017 and it was changed little from the previous year.



Figure 6: Budget status per Main Activity

Small social service charities were more likely to operate budget deficits and a balanced budget than medium-sized and large charities. Around 43.6% of small charities operated budget deficits, compared to 21.7% of large organisations and 33.9% of medium-sized organisations in 2016. Figures changed to 44%, 24.9% and 31.9% respectively in 2017.

Around 40.9% of small charities in 2016 and 44% in 2017 operated budget surplus compared to 77.8% and 75.1% of large charities and 63.7% and 66.4% of medium-sized charities. Conversely, 15.5%/11.3% of small charities operated in a balanced budget, compared to 2.4%/2.7% of medium-sized organisations and 0.5%/0% of large charities.

Charities whose main activity was law and legal services were more likely to operate budget surpluses in 2016 while charities whose main activity was income support and

maintenance were more likely in 2017. Charities whose main activity was international activities were most likely to operate budget deficits in 2016 but in 2017 civic and advocacy activities charities got the highest chance of budget deficits. Charities whose main activity was social service were most likely to have balanced budgets in 2016 but law and legal service charities became more likely in 2017.

## 6 Discussion

This report visualised the 2016 and 2017 ACNC datasets for Victoria charities and not-for-profit organisations, which is a strong and fast growing industry, particularly the social services industry. Social services industry is a key component of Victorian economy and also a key employer. It consists of thousands of charities, employing tens of thousands of staff and having thousands of volunteers. It is a billion dollar sector receiving a large amount of income from governments, donations and other revenue (eg. Service fees). The financial support from government contributes to the growth of the sector.

As the charitable and not-for-profit social services sector is so large and the nature of the data is a summary of surveyed reportings, it was necessary that analysis of the data began with exploratory techniques in the form of visualisations.

### 6.1 Interpretation of Results

#### 6.1.1 Social Services Sector Size

Considering the large contribution to essential services provided by the charities in the social services sector such as aged care, disability care, etc, it was expected that social services charities would make up a large proportion of all charities operating in Victoria. However, the finding that social services charities comprised more than 1 out of 5 Victorian charities in 2016 and 2017 highlighted the important contribution that charities make to social

services.

Considering the large quantity of charities performing social services, it was expected that a similarly large proportion of social services charities were small or medium in size. The number of large social services charities was greater than medium-sized charities for both 2016 and 2017, which could be due to the nature of the social services provided. This could be in the form that larger charities tend to provide social services such as aged care and disability care, while smaller charities provide more specialised social services like Returned Soldiers Leagues for individual communities/suburbs and individual childcare facilities.

#### 6.1.2 Workforce Composition

It was also unsurprising that charities in the social services sector employed a very large number of paid staff and volunteers throughout the years, but the visualisations revealed such a large proportion of the total workforce are employed by large charities. The visualisations also revealed that the number of volunteers working in social services charities outweighed the total number of paid staff across both years, underlining the sector's reliance on unpaid staff. When focusing on medium and smaller charities, not only do volunteers comprise the majority of staff, but they are often more than 90% of the total staff count in social services charities of these sizes.

#### 6.1.3 Sector Funding

Government grants are the majority of funding sources for charities and not-for-profits across all but one sector (international activities), and charities in the social services sector are no exception. Charities operating in social services collected the greatest amount of government grants in both 2016 and 2017, which shows how much the sector is reliant on government funding to perform their services. Furthermore, large social services charities received approximately three quarters (75%) of their total

funding from government grants in each year, which was in contrast to small and medium social charities that received smaller proportions of their funding from government grants. Large social services charities also received a much greater proportion of their funding from government grants than large charities in other sectors, which only further emphasises the reliance on government funding to maintain social services.

#### **6.1.4 Financial Health of Sector**

The visualisations exploring the financial health of the sector uncovered some concerning information. Considering the large contribution made to the social services sector by charities and not-for-profits, it is alarming that such a high percentage of charities are running a budget deficit each year. Any budget deficit places a given charity at risk of collapsing, but this risk is far greater to small charities that don't have the same cultural/marketing capital as larger charities. Therefore the fact that a greater percentage of smaller charities run a budget deficit compared to their medium- and large-sized contemporaries hints at a possible instability in the sector. Whilst ACNC data for 2018, 2019, and 2020 is not available at the time of writing this report, it would be remiss to predict that these small charities running a budget deficit would be able to endure the economic effects of the COVID-19 crisis without experiencing stability.

## **6.2 Method of Analysis**

## **6.3 Limitations and Improvements**

The data used in this report is sourced from Annual Information Statements (AIS) collected by the ACNC from registered charities categorised as charities and not-for-profit organisations. The reasons for changes in social services sector include:

- Main activity of charities are changed which may explain the big increase in the number of social services charities
- More charities completed and submitted the AIS before due date

While the report gives a detailed visualization of the data set, there still need improvements in .

## **6.4 Summary**

- Changes in numbers of charities registered with the ACNC

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## **8 Appendices**

### **8.1 Appendix 1: Guiding Questions**

- Are some types of organisations categorised as community services growing more quickly than others?
- Has there been a change in the size of organisations over time? Has the proportion of small to large sized organisations changed or remained constant? Is the change more apparent among some types of organisations?
- How many workers are employed in the community services industry? What is the breakdown of part-time/full-time/casual? Can we get this data by type of organisation? Are the proportions of casual and part-time employees growing faster in some types or sizes of organisations than others?
- Has the number of volunteers or - who they are employed by - changed over time?
- What proportion of services are providing NDIS services? Has this changed since 2017? Are large or small organisations more likely to provide NDIS services?
- Has there been a change in the source of income for community service organisations? Is this change more apparent by organisation size or type?
- Is the proportion of income being spent on employee expenses changing or remaining constant?
- What size or type of organisations are most likely to have a deficit budget?

## 8.2 Appendix 2: ACNC Datasets

The 2017 ACNC data set was sourced from the following data.gov.au website:

<https://data.gov.au/dataset/ds-dga-a1f8626c-fefb-4c4d-86ea-deaa04fb1f6e/details?q=>

This data was cleaned and filtered to VCOSS standards to ensure consistency with the 2016 dataset that was supplied by VCOSS. The below details are the requirements set out by VCOSS for cleaning.

### Appendix 1 – ACNC Data Cleaning Rules

VCOSS adopted the data cleaning rules that were developed by the Centre for Social Impact and the Social Policy Research Centre in their report [Australian Charities 2014..](#)

#### Syntax for data cleaning and data analysis

SPSS was used to clean and analyse the data. Syntax for the data cleaning and analysis is available . Much of the cleaning is to turn string (text) variables into numeric variables, which is easier for analysis. We also apply rules as outlined in the following table.

The analysis is easy to follow/recreate using the tables and charts we have publically reported as long as we use the valid data filters as created through the cleaning process.

Year on year we have needed to update the syntax because the ACNC will often change variable names which means we need to update the syntax.

Data rules:

Item/variable	Rule
Creation of Victorian Community Services Industry Dataset	<p>We usually keep all the data from across Australia in the data set and use filters in SPSS to use the data we want for Victoria.</p> <p><b>If Main Activity</b> is one of: Aged Care Activities Civic and Advocacy Activities Economic, social and community development Emergency Relief Employment and Training Housing Activities Income support and maintenance International activities Law and Legal Services Mental health and crisis intervention Other Education Other health service delivery Social Services</p> <p><b>If Other Activity</b> offered by the charity is from one of the above list.</p> <p>We create Community Sector Charity variable.</p> <p>Then to create the Victorian Community Services Charity variable it is if orgs operate activities as above and it is they are based in Victoria (State=Victoria) and operating in Victoria (Operates in VIC). This means that this dataset will pick up organisations based in Victoria, operating in Victoria, but also operating in other states.</p>

<b>Item/variable</b>	<b>Rule</b>
Size of organisation	<p>Organisations self-select their organisational size            Small = Revenue Less than \$250,000            Medium= Revenue of \$250,000 to \$999,999            Large = Revenue of \$1 million or more</p> <p>This is checked against Total Gross Income of the organisation</p> <p>We have also added an additional size category for organisations into the following:            Extra Small= &lt;\$50,000            Small = \$50,000-&lt;\$250,000            Medium = \$250,000 to &lt;\$1m            Large-\$1m to &lt; \$10m            Extra Large \$10m to &lt; \$100m            Extra-extra- large &gt;\$100m</p> <p>This will be useful to track over time in terms of whether the number of large to extra/extra-large organisations has grown</p>
Income	Data is checked, if there is no income for the organisation then these are excluded from the analysis
Inaccurate Income Data	<p>The sum of individual income fields and total income differ by more than \$25,000 for small charities</p> <p>The sum of individual income fields and total income differ by more than \$100,000 for medium charities</p> <p>The sum of individual income fields and total income differ by more than \$1,000,000 for large charities</p>
Inaccurate expenditure data	<p>The sum of individual expense fields and total expenses differ by more than \$25,000 for small charities</p> <p>The sum of individual expense fields and total expenses differ by more than \$100,000 for medium charities</p> <p>The sum of individual expense fields and total expenses differ by more than \$1,000,000 for large charities</p> <p>Employee expenses per reported employee exceeds \$300,000.</p>
Ratios	<p>Ratios (e.g. Government grant per total gross income) exceed 100%</p> <p>Negative values (e.g. negative employee expenses or liability).</p>
Valid Financial data	Variable created to ensure that after all checks data is valid

### 8.3 Appendix 3: Identifying Invalid ABNs

```
# Removing Invalid ABNs

## Reference Keybreaker file

ABN_Keybreaker <- read_excel("VCOSS Data/ABN Keybreaker.xlsx")

datatable(ABN_Keybreaker,
         class = "compact",
         options = list(pageLength = 11,
                        searching = FALSE,
                        lengthChange = FALSE))

## Function for checking ABNs

ABN_Checker <- function(ABN_No) {

  sumproduct <- c()

  for(position in 1:nchar(ABN_No)) {

    number <- as.numeric(substr(ABN_No, position, position))

    if(position == 1) {

      number <- as.numeric(number - 1)

    }

    product <- (number * ABN_Keybreaker$Weighting[position])

    sumproduct <- sum(sumproduct, product)

  }

  if(sumproduct %% 89 == 0) {

    Check <- "Valid ABN"

  } else {

  }

}
```

```

Check <- "Invalid ABN"

}

return(Check)

}

ABN_Validator <- function(ABN_vector) {

  sapply(ABN_vector, ABN_Checker)

}

VCOSS_ACNC_16 <- mutate(VCOSS_ACNC_16,
                        ABN_Validation = ABN_Validator(abn))

Invalid_ABNs_16 <- filter(VCOSS_ACNC_16,
                           ABN_Validation == "Invalid ABN")

VCOSS_ACNC_17 <- mutate(VCOSS_ACNC_17,
                        ABN_Validation = ABN_Validator(abn))

Invalid_ABNs_17 <- filter(VCOSS_ACNC_17,
                           ABN_Validation == "Invalid ABN")

## Filter out invalid ABNs from VCOSS dataframes

VCOSS_ACNC_16 <- VCOSS_ACNC_16[which(! (VCOSS_ACNC_16$abn %in% Invalid_ABNs_16$abn)), ]

VCOSS_ACNC_17 <- VCOSS_ACNC_17[which(! (VCOSS_ACNC_17$abn %in% Invalid_ABNs_17$abn)), ]

```