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INSIGHT IN DATA

BEYOND THE STARS

FIJI PILOT - PROGRAM EVALUATION

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2019 I JANUARY

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Specialising in data analytics, public policy and government, Phoensight is dedicated to tending to the interrelationships between people, their communities and technologies,

Phoensight empowers organisations to achieve their goals and visions using innovative and holistic approaches, while being on the leading edge of technology.

Working with accredited Warm Data hosts that are certified by the International Bateson Institute (IBI), Phoensight also offers clients the experience of a Warm Data Lab, as a practical approach in working with the complexities they encounter.

Phoensight has a deep respect for people and communities, and is committed to supporting diversity and inclusion. Phoensight also acknowledges the Traditional Owners upon whose ancestral lands we live and work, and pay respect to their Elders, past, present and emerging

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Summary

In December 2018, S1T2 engaged Phoensight to conduct a preliminary analysis of the '*Beyond the Stars*' 5-week pilot program in Fiji to explore the effectiveness of the program, test program expectations and provide recommendations for implementing the longer-term program.

This report presents some preliminary results undertaken by Phoensight on data collected during the pilot to assess the effectiveness of the program and provide recommendations for future iterations of the program.

Key Points

- A preliminary analysis of the program data suggests that children participating in the BTS program were on average around 8 per cent more likely to identify good foods from bad[1].
- Participants were also on average, 14 per cent more likely to express preferences for incorporating healthier foods into their diet. Additionally, participants were 37 to 58 percent less likely to select unhealthy foods when asked which foods they'd like to eat[2].
- The analysis also suggests that improvements in the understanding and perception of healthy foods appear to be unequal across survey questions, with the *least* 'statistically convincing' improvements occurring for more detailed questions. These include questions that require the children to rank foods from good to bad or the identification of foods with high levels of 'salt', 'sugar' or 'fat'.
- Despite this, the absence of a baseline[3] (or control group) and both the size and limited variation in the delivery of the pilot program make it difficult to draw definitive conclusions on the benefits of the program relative to more traditional teaching styles.
- Similarly, it is also difficult to identify the impact and effectiveness of *individual components* of the program based on this pilot alone, with limited variation in the delivery of the curriculum such as with/without VR, with/without the activity book and with/without the use of the interactive game.

[1] Based on Question 12 from the '*Evaluation Survey*'.
[2] Refer to Table 2 in this report.
[3] Indeed, the '*Evaluation Framework – Beyond the Stars*' report prepared for SecondMuse and S1T2 note in the 'Data Collection' section, that a comparison between children who have participated in the pilot and those who have not (from previous years) might prove useful for this analysis.

Background

'*Beyond the Stars*' (BTS) tangential learning program seeks to help children learn about healthy eating, physical activity and their environment through a complementary set of learning tools such as virtual reality, animated short-films, educational story books and out of class activities. In 2018 the program was piloted over 5 weeks across rural and urban communities in Fiji with over 300 children having since completed the program.

The '*Evaluation Framework – Beyond the Stars*[4]' cites that "*many young children in the region face significant issues with malnutrition…*" with impacts being a result of a number of factors "*including the glamorisation of imported and processed foods and the subsequent downgrading of traditional foods and food cultivation practices*".

Brief

The aim of the BTS program is that "*participating children will have attitudinal shifts around food choices, especially in terms of their perceptions of healthy foods. Children's attitudinal shifts around food will be supported by teachers and parents valuing the use of innovative storytelling technology in teaching.*"[5]

S1T2 is interested in an independent evaluation exploring the effectiveness of the pilot program, validating expectations and ensuring that key insights from the pilot can be incorporated into the longer-term program. This includes exploratory and statistical analysis of the child and parent survey response data, both before and after program intervention. An initial investigation into the 'Game data' as to how this may inform future approaches of the program was also sought.

[4] '*Evaluation Framework – Beyond the Stars*' prepared for SecondMuse and S1T2, Clear Horizon Consulting, 29 March 2018.
[5] From the Pilot narrative in '*Evaluation Framework – Beyond the Stars*' prepared for SecondMuse and S1T2, Clear Horizon Consulting, 29 March 2018.

Our Approach

This report details the preliminary analysis undertaken for the purpose of assessing the overall impact of the BTS program. Given the aim of the program is to encourage healthier life choices through empowering participants with knowledge about the health consequences of their choices, the analysis presented is based on the comprehensive theory of change outlined in the Beyond the Stars Evaluation Framework, 29 March 2018. Although we cannot conclusively test this Theory of Change (ToC), given the size, timeline and structure of the pilot, for this causal chain described in the ToC to be true:

1. The program must improve the participant's knowledge of healthy life choices; and
2. As a consequence of this knowledge, participants would hold stronger preferences for healthier foods; resulting in
3. Healthier choices and greater wellbeing for participants, families and communities.

Based on this premise, we propose the testing of **four key hypotheses**[6]:

1. *Participants are more likely to correctly identify healthy and unhealthy foods after program participation;*
2. *The preference of participants for good foods increased after program participation;*
3. *The families of participants consumed more good foods after program participation; and*
4. *That parents of the children participating in the program and/or their teachers believe the BTS program has contributed positively to the wellbeing of their children, families, classes and/or communities.*

Our approach in assessing the success of the BTS program is to use **Hypothesis testing**, which is the process of using statistics for determining the probability that a specific hypothesis is true based on the data collected. This will allow us to more conclusively test how well these statements apply to a population, based on the sample data.

The sample size and the magnitude of the effects observed by the impacts delivered through the BTS program are important for hypothesis testing and conclusively supporting

[6] While the hypotheses in this report were independently selected by Phoensight, they have been broadly based off the theory of change presented in outlined in the Beyond the Stars Evaluation Framework, 29 March 2018. For reference, Hypothesis 1,2 and 4 selected in this report correspond to outcomes 2, 3 and 1 in the '*Evaluation Framework – Beyond the Stars*' ToC. Hypothesis 3 was selected as the most viable hypothesis for proxying the health outcomes of participants, given data collected during the pilot (outcome 4).

or rejecting each statement. For this reason, it is necessary and crucial that the sample size is large enough for any *statistical inferences* to be valid.

By running a **t-test**, each of the hypotheses are evaluated to determine if the results for each test are *statistically meaningful* and not attributed to experimental error or standard deviation. Moreover, these tests were conducted at a *significance level* of 5 per cent so that the hypothesis statements can be considered with a 95 per cent level of confidence or certainty.

Data

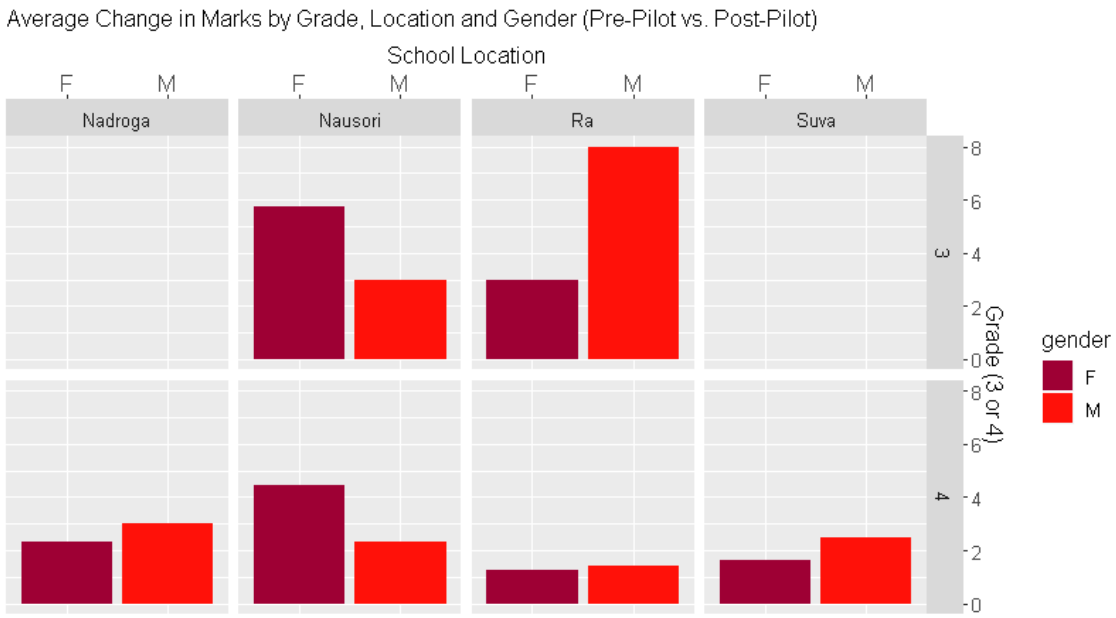
The data collected during the BTS program comprises of a mix of quantitative and qualitative data collected before, during and after the pilot. From this, the program may be analysed to provide evidence of the impact that interactive technologies have in social intervention. These datasets include:

- **Pre-pilot evaluation survey results:** 212 records – including results from individual questions posed to program participants before the pilot was implemented. Questions were mainly related to food preferences and the participant's ability to identify healthy versus unhealthy foods.
- **Post-pilot evaluation survey results**: 118 records – including results from individual questions posed to program participants after the pilot was implemented. Questions were mainly related to food preferences and the participant's ability to identify healthy versus unhealthy foods.
- **Demographics**: 313 records – including the child's gender, location, participation in the program, use of complementary materials and the parent's consent and involvement in participating in the program.
- **Activity Book Data**: 312 records – including measures of a parent's involvement in the program, such as their consent to their child participating in the program and the percentage of at-home activities that were completed with the parent; and
- **Parent Surveys (post-pilot and pre-pilot)** – 39 records – including parent perspectives on the effectiveness of the program, its impact on their family and recommendations for future programs.
- **Game Data:** A combination of online and offline data. 163 game data log reports in JSON format. The video game data was not used for this analysis.

Summary Statistics

After the completing the BTS program, participants on average achieved higher marks for identifying healthy foods from bad foods and also for expressing preferences for healthy foods. Although it is difficult to conclusively assign this outcome to the program due to the non-random selection of participants and pilot locations,[7] when results were examined between the most comparable sub-groups this was still true. In particular, an increase in average marks were observed across gender, pilot location and class year (see **Figure 1**).

Figure 1: Average change in marks pre- versus post-pilot by location, gender and grade



Nevertheless, given the relatively small sample size of each sub-group of the BTS program it is useful to consider the scope, reach and the number of participants in the program to ensure estimates are based on sufficient data for results to be meaningful. For this reason, it is instructive to first examine the sample sizes in deriving an indication of the 'testable sub-groups', with **Table 1** providing the number of participants by both region and pilot stage.

[7] Randomized controlled trials are conducted by randomly selecting who participates in a program and who doesn't. With adequate sample sizes, differences in participant outcomes can be more confidently associated with program intervention, since the observed and unobserved factors are less likely to be associated with the intervention. While there is an increasing trend in the use of randomized controlled-trials for evaluating the effectiveness of development programs, in many circumstances applying such a methodology can be outside a program's scope. Despite this, they are important for evaluating program effectiveness by addressing: whether the sample sizes of the data collected is sufficient; the comparability and the extent of variation presented in a study; and how representative this sample is of the wider community.

Table 1: Number of participants by region during each stage of the BTS program

	Nadroga	*Nausori*	*Ra*	*Suva*	*Total*
Pre-Pilot (no. of students)	68	40	34	65	**207**
Post-Pilot (no. of students)	17	24	21	50	**112**
Participants in both	13	24	19	40	**96**

As shown in **Table 1** while, a total of 319 evaluations were completed by participants, less than half of these can be used for measuring the impact of the pilot, with 96 participants having completed both forms. At the same time, outside of Suva, the most comparable 'high-level' subgroups all have sample sizes less than 30, which typically requires caution when applying statistical testing (particularly where samples have been non-randomly selected). Nevertheless, descriptive analysis for smaller sub-groups still provides useful insights, while more formal statistical tests will be conducted using the full sample of 96 participants.

Hypothesis Testing

Hypothesis 1: "Participants were more likely to correctly identify healthy foods after participation in the program"

Outcome: *Participants appeared more likely to correctly identify healthy and unhealthy foods after the pilot program.*

The null hypothesis, which states that the change in marks is statistically insignificant, was rejected at the 5 per cent level of significance (as detailed in **A**).

To determine whether observed changes from the pilot were statistically significant, paired t-tests were conducted on questions deemed relevant to the hypothesis.

To test this hypothesis, questions that asked participants to explicitly identify healthy and unhealthy foods were analysed. In addition, totals by theme were also taken on the basis of whether the question asked participants to identify unhealthy or bad foods.

The questions selected for testing Hypothesis 1 include:

Theme 1: Identifying Healthy Foods:

- Q6: Which of these foods do you think is a healthy food?
- Q8: Which of these foods do you think is more healthy?
- Q12: Circle the foods that are good foods.

Theme 2: Identifying Unhealthy Foods:

- Q7: Which of these do you think is an unhealthy food?
- Q9: Which of these foods do you think has a lot of salt?
- Q10: Which of these foods do you think has a lot of sugar?
- Q11: Which of these foods do you think has a lot of fat?

Changes in student marks were calculated both for individual questions and by theme, and there appeared to be an increase in the average mark of *1.65 marks* for questions requiring participants to identify healthy foods, and an average increase of *0.36 marks* for questions asking participants to identify unhealthy foods.

This means that children on average achieved an increase in marks of *11 per cent* for identifying healthy foods and an average increase in marks of *10 per cent* for identifying unhealthy foods. These changes are shown in **Figure 2**.

Figure 2: **Change in marks for identifying healthy (LHS) and unhealthy foods (RHS)**

To test this formally, paired t-tests were conducted both on the two themes and the individual questions. This was done to determine the likelihood that these changes didn't occur by chance or that there was no improvement in a participant's ability in identifying good food.

Based on the results from the paired t-tests on the two themes, participants on average appeared more likely to correctly identify healthy and unhealthy foods after the program with the null hypothesis being rejected for both Theme 1 and 2, at the 5 per cent level of significance (see Annexure A).

However, results from individual questions underlying the two themes place some doubt around these, with tests suggesting the recorded changes in average mark achieved for questions 6 to 11 are not statistically significant.

While there are a number of possible reasons for these seemingly contradictory results, one explanation is that children were more comfortable choosing healthy foods when presented with a simpler decision criteria and a full list of options, as opposed to ranking them or selecting which foods contained sugar, salt or fat.

Key Observations

- Although the analysis suggests participants were more likely to be able to identify good foods from bad food after the BTS program, the results were least convincing for questions which asked children to specify foods with high levels of sugar or salt.
- At the same time, it's plausible that the strength of the results observed for Question 12 may have to do with its presentation of the problem being more familiar and/or accessible to participants, with similarly formatted questions (such as Question 3, Question 4 and Question 5) also achieving strong results.

Conclusion

It appears reasonable to conclude that, on average, participants were better able to differentiate which foods were healthy versus which were unhealthy after the program. However, results from the analysis were ambiguous for more detailed questions (including Questions 6 to 11), making it uncertain as to: how well the evaluation was understood; whether more detailed aspects of the curriculum were internalized; or how the knowledge will be applied practically into behavioural change.

Hypothesis 2: "The preference of participants for good foods increased after program participation"

Outcome: *Participants appeared more likely to express a preference for healthy foods after the BTS program.*

The null hypothesis that the change in marks for expressing a preference for healthy foods was insignificant was rejected at the 5 per cent significance level, for the overall theme and individual questions relating to the food preference of participants.

To test this hypothesis, questions that asked participants to express preferences for healthy foods were analysed, with each healthy food being worth 1 mark. The change of marks under this theme of questions was then calculated before and after the pilot.

Theme 3: Preference for Healthy Foods:

- Q3: Can you find three foods that you would like to eat?
- Q4: Can you find your favourite food?
- Q5: Can you find three foods that you would have for dinner?

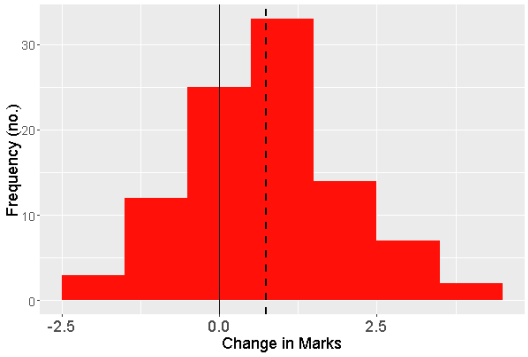
Statistical summaries were also developed for these questions in the interest of examining changes in the reported preferences of participants before and after the pilot. As shown in **Table 2** below, there appeared to be an increase in the reported preferences for healthy food, with an almost equivalent decrease in preferences for unhealthy foods.

Table 2: Changes in reported food preferences by food status

Question	*Status*	*Pre-Pilot*	*Post-Pilot*	*Change (no.)*	*%*
Q3 ~ 3 foods you would like to eat	Healthy	233	263	30	13%
Q4 ~ Your favourite food		68	78	10	15%
Q5 ~ 3 foods you would have for dinner		211	237	26	12%
Q3 ~ 3 foods you would like to eat	Unhealthy	52	22	-30	-58%
Q4 ~ Your favourite food		27	17	-10	-37%
Q5 ~ 3 foods you would have for dinner		73	46	-27	-37%

Based on the questions selected for Theme 3, participants appeared to be more likely to express preferences for healthy foods after the program was conducted. In particular participants achieved an average increase of 0.75 marks for identifying healthy foods when asked their preferences, representing an average increase of 14 per cent.

Figure 3: **Change in marks for preferring healthy foods over unhealthy foods**



To test this formally, paired t-tests were then conducted, both on totals for questions under Theme 3 and for each question individually. Results suggest that we can reject the null hypothesis that there was no improvement in preferring healthier foods after the program, with the t-test suggesting changes in both the total marks under Theme 3 and those of individual questions are statistically significant (Annexure A).

Conclusion:

Based on results from the t-test, it appears likely that the preference of respondents for good foods increased after participation in the pilot program. However, it is unclear as to what extent responses from the pre and post pilot evaluation surveys accurately present both the *real preferences* of participants and *actual changes* in their diet.

Hypothesis 3: "The families of participants consumed more good foods after program participation."

Outcome: *There did not appear to be any conclusive evidence that participants' diets had improved after the pilot.*

This hypothesis was investigated by creating a list of healthy and unhealthy foods and assessing average changes in their reported consumption before and after the program, and was inconclusive.

Although participants' diets were not directly measured during the program, children were asked to self-report their most recent meals (breakfast and dinner) as part of the survey. Since improving the participant's diet is key in achieving better health outcomes the following questions were assessed under this theme:

- **Theme 4: Reported Dietary Outcomes**
  - Q1: What did you eat for breakfast this morning?
  - Q2: What did you eat for dinner last night?

An analysis of the qualitative data from Q1 and Q2 can yield insights into whether the students and their families adopted positive behavioural changes into their dietary preferences. Thus, program outcomes such as improvements in choosing healthy foods and rejecting unhealthy food may support this hypothesis.

The following approach was used to obtain evidence in supporting Hypothesis 3:

1. Responses to Q1 and Q2 were analysed to create a list of the most frequently reported foods;
2. Each food on the list was categorised as 'healthy', 'neutral' or 'unhealthy' using the BTS program's healthy/unhealthy food listing (where possible) and advice from S1T2 (See **Annexure B** for list);
3. Each participant's reported food choices were then rated according to the frequency 'healthy' and 'unhealthy foods to allow for the change in the average number of healthy and unhealthy foods to be calculated;
4. Total scores were then calculated for both questions and results were examined to determine whether any differences could be attributed to the program

Based on this approach, scores for reporting healthy foods increased by 0.03 marks on average for Question 1 and 0.1 marks for Question 2. At the same time, however, average scores for reporting unhealthy food also increased by 0.04 marks for Question 1 and marks for Question 2 remained relatively unchanged (**Table 3**).

At the same time, while the average change in scores were clearly too small to provide a conclusive assessment of changes in the diet of participants, some charts indicating the probability distribution of these results have been provided in **Annexure D** for reference.

Table 3: Descriptive statistics scores for reporting healthy and unhealthy food (Q1 & Q2)

	Scores for Reporting Healthy Food		*Scores for Reporting Unhealthy Food*	
Statistic	**Q1**	**Q2**	**Q1**	**Q2**
n	96	96	96	96
Average change in marks	0.03	0.1	0.04	0.0
Standard deviation	1.0	1.0	0.81	0.7
Min	-3.0	-2.0	-2.0	-2.0
25%	-1.0	-1.0	0.0	0.0
50%	0.0	0.0	0.0	0.0
75%	1.0	1.0	1.0	0.0
Max	2.0	2.0	2.0	1.0

Conclusion

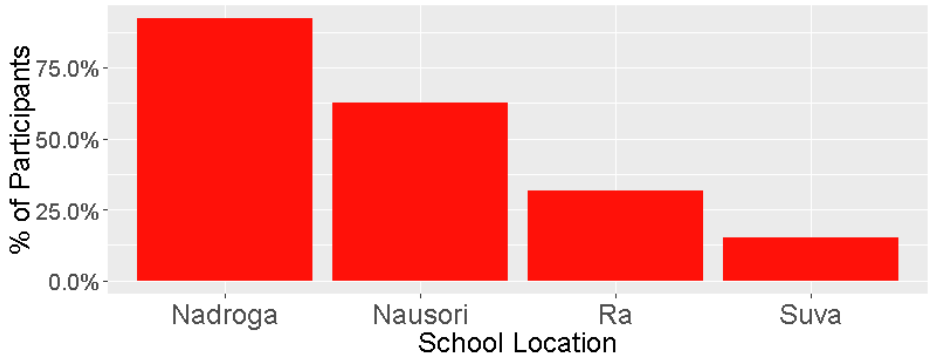
While the methodology provided quantitative scores for the diet of participants before and after the program, the changes observed were negligible, and therefore did not provide sufficient evidence to support this Hypothesis.

Hypothesis 4: "That parents of the children participating in the program believe the program contributed positively to the wellbeing of their children, families, classes and/or communities."

Outcome: *The parents and/or guardians surveyed felt the pilot contributed positively to the wellbeing of their children, family and communities, with results of the post-pilot survey being overwhelmingly positive.*

As no quantitative data was available to test this hypothesis, information from the qualitative interviews and surveys from parents were relied on. Feedback was sought as part of a small set of interviews (4 responses) and a more widely distributed survey at the conclusion of the pilot (39 responses) was also analysed.

Figure 8: Parent surveys as a percentage of participants in pre/post surveys



Although a variety of questions were posed, both the surveys and interviews sought direct input from parents and guardians' questions directly relevant to this hypothesis, including:

- Q5: Has Beyond the Stars changed your child's attitudes about healthy eating? If yes, how?
- Q6: Has your child's participation in Beyond the Stars changed how you think about healthy eating? If yes, how?
- Q7: Has your child's participation in Beyond the Stars changed anything in your family/household? If yes, what?

The results to these questions were overwhelmingly positive, with most respondents perceiving positive changes in their child's attitude and a stronger desire to consume healthier foods. At the same time, many parents also noted positive changes outside of the more direct aims of the curriculum, such as their children waking up earlier, looking healthier and contributing more to the household.

"Yes. My child has really taught me a lot about the choice of food we eat. Most of the time we eat fried foods, now we are eating less of fried foods."

Conclusion

The results suggest that parents believe the program has positively contributed to the wellbeing of their children. It is interesting to note, however, that parent survey responses varied by location, with some locations such as Suva and Ra, being significantly underrepresented in the parent survey dataset. Also, while qualitative surveys are important for thoughtfully evaluating the success of the program, it may be useful to also collect quantitative information for estimating the program on behavioural changes in diet.

Key Observations

While the results from parents were clearly positive, a number of observations were made:

- A small proportion of parents had returned surveys, with some locations being particularly under-represented. While this might not necessarily alter the conclusions drawn, non-responses may be an indicator of the relative levels of buy-in to the program from parents and would require further investigation;

- Based on the survey responses it was not clear if the core benefits of the program related to its innovative nature (such as the use of VR and interactive video games). Rather, many parents spoke of how helpful the activity book was as a resource, although this may also be reflective of this being the resource most directly being interacted with by parents.

Limitations

The analysis undertaken and results presented are subject (and not limited) to the assumptions and limitations of the statistical methods used, data quality, impact limitations (being restricted to certain regions) and design limitations. Some of these include:

- **Sampling bias and pilot representativeness:** The results from the analysis rely heavily on the selection of participants in the pilot program. Given no control group was selected and participants were not randomly selected, it is difficult to know the extent to which the results from the pilot may be generalised to other regions or larger scales.

- **Short-timeframe of the pilot versus long-term aims:** Data analysed was predominantly based off a short-term pilot conducted from October to November of 2018. Given this timeframe, it is difficult to assess the program's ability to drive long-term behavioural changes in participants.

- **Survivorship bias:** it is not clear whether the participants that were retained and surveyed after the pilot might impact the results. For instance, if high-performing children were more likely to continue and be surveyed after the pilot, results will be positively biased.

- **Self-reporting accuracy:** It is assumed that participants have accurately reported their food preferences and their most recently consumed meals. The accuracy of this reporting might be impacted by participants responding according to what they deem as the 'correct' answer given what they've learnt in the program.

- **Cultural factors**: Fiji's ethnic and cultural factors may have influenced the results. As a result, key variables such as diet, access to resources, lifestyle and English language skills all being likely to vary across schools and individual participants potentially biasing results.

Recommendations:

The program's effectiveness should be assessed against a comparable baseline. Although the results from the program are positive, it was not possible to assess its relative effectiveness against a more traditional delivery of the curriculum. Future implementation of the program could attempt to overcome this by providing components of the program to be taught in more traditional learning settings, such as without the use of VR and the game, and comparing its effectiveness with the full program.

Data Hygiene and Governance design.
It is recommended that data capturing and analytics-ready data have greater parity in the next phase of the program. For example, Question 1 and Question 2 should have greater consistency to limit ambiguity e.g. fish in lolo and fish in coconut milk were coded as separate foods but could potentially be combined into one category.

Game and activity book data could be better used to evaluate and monitor the program. Both the game and activity book data represent rich potential sources for monitoring and evaluating the program. Future programs may incorporate questions that help streamline evaluation of the program, such as having participants report on their diet and preferences through a set list of unmarked multiple-choice questions as part of the activity book and/or within the game. Greater keyword and feature parity between the video game, VR, book and survey will also ensure seamless analytics between different datasets so that the data is analytics-ready without requiring significant data hygiene overheads post data capture.

A post-program evaluation survey could be conducted periodically after the program. While a relatively short time frame of the BTS program is not uncommon, it makes it difficult to conclusively assess whether shifts towards healthy eating by children and their families are transitory or reflect longer-term attitudinal shifts. To address this, it is suggested that post-program evaluation surveys could be delivered both immediately after the program and at a longer interval after the conclusion of the program.

Interactive focus group sessions could be conducted to better understand how knowledge from the program may best be assessed. Although it is difficult to assess conclusively, the questions that showed the most 'statistically convincing' change in outcomes tended to be those that asked participants to separate healthy and unhealthy foods. While this may be a reflection of the question's relative complexity, ensuring all participants are able to demonstrate their knowledge effectively will help ensure the successes of future versions of the program.

Efforts could be made to measure the program's ability to empower participants and influence the behaviour of their peers, family and local community: Creating long-term behavioural changes in participants requires both that children are better informed and that they can apply this information in their daily lives. As the impact of the program on children may vary according to factors such as their gender, cultural context and income, better understanding and monitoring could help ensure the program achieves a lasting and widespread an impact as possible.

Annexure A

Paired t-test results[8]

To determine the likelihood that differences in the marks achieved by participants before and after the pilot were not a result of chance, paired t-tests were conducted on individual questions and totals across dimensions related to the underlying hypotheses.

Tests were conducted under the null hypothesis that changes in average marks were not statistically different from zero. Under the decision rule to reject the null hypothesis where the 'p-value' is less than 0.05 (under the 5 per cent level of significance) it's considered unlikely that changes in average marks were a result of chance. The table below summarizes these results:

Question(s) tested (paraphrased for brevity):	**p-value**	**t-stat**	**Reject H0**	**n**
Question 1 – Eaten for breakfast	N/A*			
Question 2 – Eaten for dinner				
Question 3 – Foods you'd like to eat	1.00E-05	-4.66	Yes	96
Question 4 – Favourite food	0.033542	-2.16	Yes	96
Question 5 - Food you'd have for dinner	0.003748	-2.97	Yes	96
Question 6 – Which food in list is healthy?	0.093595	-1.69	No	94
Question 7 – Which food in list is unhealthy?	0.071662	-1.82	No	96
Question 8 – Which food is healthier?	0.234756	-1.20	No	96
Question 9 – Which food has a lot of salt?	0.291269	-1.06	No	94
Question 10 – Which food has a lot of sugar?	0.222507	-1.23	No	95
Question 11 – Which food has a lot of fat?	0.079538	-1.77	No	94
Question 12 – Select which foods in list are good	0	-6.77	Yes	95
Total Marks (Q3 to Q12)	0	-7.70	Yes	88
Theme 1: Identifying healthy foods (Q6, Q8 and Q12)	0	-6.26	Yes	93
Theme 2: Identifying unhealthy foods (Q7, Q9, Q10 and Q11)	0.00772	-2.73	Yes	91
Theme 3: Preference expressed for healthy foods (Q3, Q4 and Q5)	0	-5.77	Yes	96
Theme 4: Reported Dietary Outcomes (Q1 and Q2)	N/A*			

[8] *Paired t-tests were not conducted for Questions 1, 2 or Theme 4 due to the data's distribution not conforming to the assumptions required.

Theme 1:
T-test confirms that the change in marks is statistically significant (t = -6.258 and p = 1.22E-08) at the 5 per cent significance level. The null hypothesis can be rejected. The alternative hypothesis that participation in the program improved the likelihood of identifying bad food can be considered.

Theme 2:
T-test confirms that the change in marks is statistically significant (t = -2.725 and p = 0.008) at the 5 per cent significance level. The null hypothesis can be rejected. The alternative hypothesis that participation in the program improved the likelihood of identifying bad food can be considered.

Theme 3:
T-test confirms that the change in marks is statistically significant (t = -5.772 and p = 9.818e-08) at the 5 per cent significance level. The null hypothesis can be rejected. The alternative hypothesis that participation in the program improved the likelihood of preferring good food can be considered.

Annexure B

Unhealthy Foods	Healthy Foods
beef chop suey	apple
beef curry	banana
beef stew	bele
biscuit	bele in lolo
bread	boiled cassava
bun	boiled chicken
cake	boiled fish
cheese	boiled taro
chicken chop suey	breadfruit
chop suey	cabbage
coffee	carrot
corned beef curry	cassava
egg sandwich	cereal
fried cabbage	chicken
fried chicken	chicken curry
fried egg	chicken curry with rice
fried fish	chicken soup
fried mutton	chicken stew
hot chocolate	curry
lettuce sandwich	dhal
lolo bun	dhal soup
mango jam	egg
milk with cocoa	eggplant curry
milo	fish
noodles	fish curry
pancakes	fish in coconut milk
pie	fish in lolo
rice pops	fresh tuna
roast chicken	fruit
sausage soup	lemon tea
sausage stew	milk
scone	mushroom
sliced bread	mussels
sugar	mutton
toast	mutton curry
vudi	onion stew
	ota
	peanut butter
	porridge
	potato
	potato curry
	prawn curry
	pumpkin
	pumpkin curry
	rice
	rice in coconut milk
	roti
	rou rou
	rou rou in lolo
	soup
	taro
	tea
	tinned fish
	tinned fish curry
	tinned tuna
	tomato
	tuna
	tuna curry
	vegetable curry
	Weetbix ,yams

Annexure C

Most commonly reported food preferences:

(Q3 ~ Three foods would like to eat)

	Status	Pre-Pilot	%	Post-Pilot	%
Pineapple	Healthy	44	15%	38	13%
Taro	Healthy	41	14%	49	17%
Paw Paw	Healthy	30	11%	32	11%
Cabbage	Healthy	28	10%	44	15%
Pumpkin	Healthy	26	9%	25	9%
Crab	Healthy	24	8%	24	8%
Grilled Fish	Healthy	20	7%	28	10%
Rice	Healthy	15	5%	15	5%
Battered Fish	Unhealthy	13	5%	3	1%
Fruit Drink	Unhealthy	10	4%	5	2%
Sausage	Unhealthy	9	3%	2	1%
Chicken Nuggets	Unhealthy	8	3%	6	2%
Chocolate	Unhealthy	6	2%	2	1%
Beef	Healthy	5	2%	8	3%
Instant Noodles	Unhealthy	3	1%	1	0%
Roti	Unhealthy	2	1%	3	1%
Fizzy Drink	Unhealthy	1	0%	0	0%
Total		285	100%	285	100%

Most commonly reported food preferences:

(Q4 ~ Favourite food)

	Status	Pre-Pilot	%	Post-Pilot	%
Pineapple	Healthy	24	25%	19	20%
Crab	Healthy	8	8%	12	13%
Sausage	Unhealthy	8	8%	4	4%
Grilled Fish	Healthy	7	7%	10	11%
Paw Paw	Healthy	6	6%	12	13%
Roti	Unhealthy	6	6%	5	5%
Taro	Healthy	6	6%	7	7%
Rice	Healthy	5	5%	3	3%
Battered Fish	Unhealthy	4	4%	0	0%
Beef	Healthy	4	4%	1	1%
Cabbage	Healthy	4	4%	7	7%
Pumpkin	Healthy	4	4%	7	7%
Chicken Nuggets	Unhealthy	3	3%	3	3%
Chocolate	Unhealthy	3	3%	1	1%
Fruit Drink	Unhealthy	3	3%	1	1%
Fizzy Drink	Unhealthy	0	0%	1	1%
Instant Noodles	Unhealthy	0	0%	2	2%
Total		95	100%	95	100%

Most commonly reported food preferences:

(Q5 ~ Three foods would like for dinner)

Food	Status	Pre-Pilot	%	Post-Pilot	%
Taro	Healthy	44	15%	60	21%
Pumpkin	Healthy	34	12%	35	12%
Cabbage	Healthy	28	10%	43	15%
Grilled Fish	Healthy	27	10%	30	11%
Rice	Healthy	25	9%	26	9%
Beef	Healthy	19	7%	20	7%
Crab	Healthy	18	6%	12	4%
Roti	Unhealthy	18	6%	7	2%
Battered Fish	Unhealthy	15	5%	15	5%
Sausage	Unhealthy	13	5%	6	2%
Chicken Nuggets	Unhealthy	11	4%	5	2%
Paw Paw	Healthy	9	3%	6	2%
Fruit Drink	Unhealthy	8	3%	0	0%
Pineapple	Healthy	7	2%	5	2%
Instant Noodles	Unhealthy	7	2%	12	4%
Fizzy Drink	Unhealthy	1	0%	1	0%
Total		284	100%	283	100%

Most commonly reported food preferences:

(Q3 + Q4 + Q5)

	Status	Pre-Pilot	%	Post-Pilot	%
Taro	Healthy	91	14%	116	17%
Pineapple	Healthy	75	11%	62	9%
Pumpkin	Healthy	64	10%	67	10%
Cabbage	Healthy	60	9%	94	14%
Grilled Fish	Healthy	54	8%	68	10%
Crab	Healthy	50	8%	48	7%
Paw Paw	Healthy	45	7%	50	8%
Rice	Healthy	45	7%	44	7%
Battered Fish	Unhealthy	32	5%	18	3%
Sausage	Unhealthy	30	5%	12	2%
Beef	Healthy	28	4%	29	4%
Roti	Unhealthy	26	4%	15	2%
Chicken Nuggets	Unhealthy	22	3%	14	2%
Fruit Drink	Unhealthy	21	3%	6	1%
Instant Noodles	Unhealthy	10	2%	15	2%
Chocolate	Unhealthy	9	1%	3	0%
Fizzy Drink	Unhealthy	2	0%	2	0%
Total		664	100%	663	100%

Annexure D

Figure D.1: Probability distributions and QQ plots healthy foods pre/post pilot (Q1)

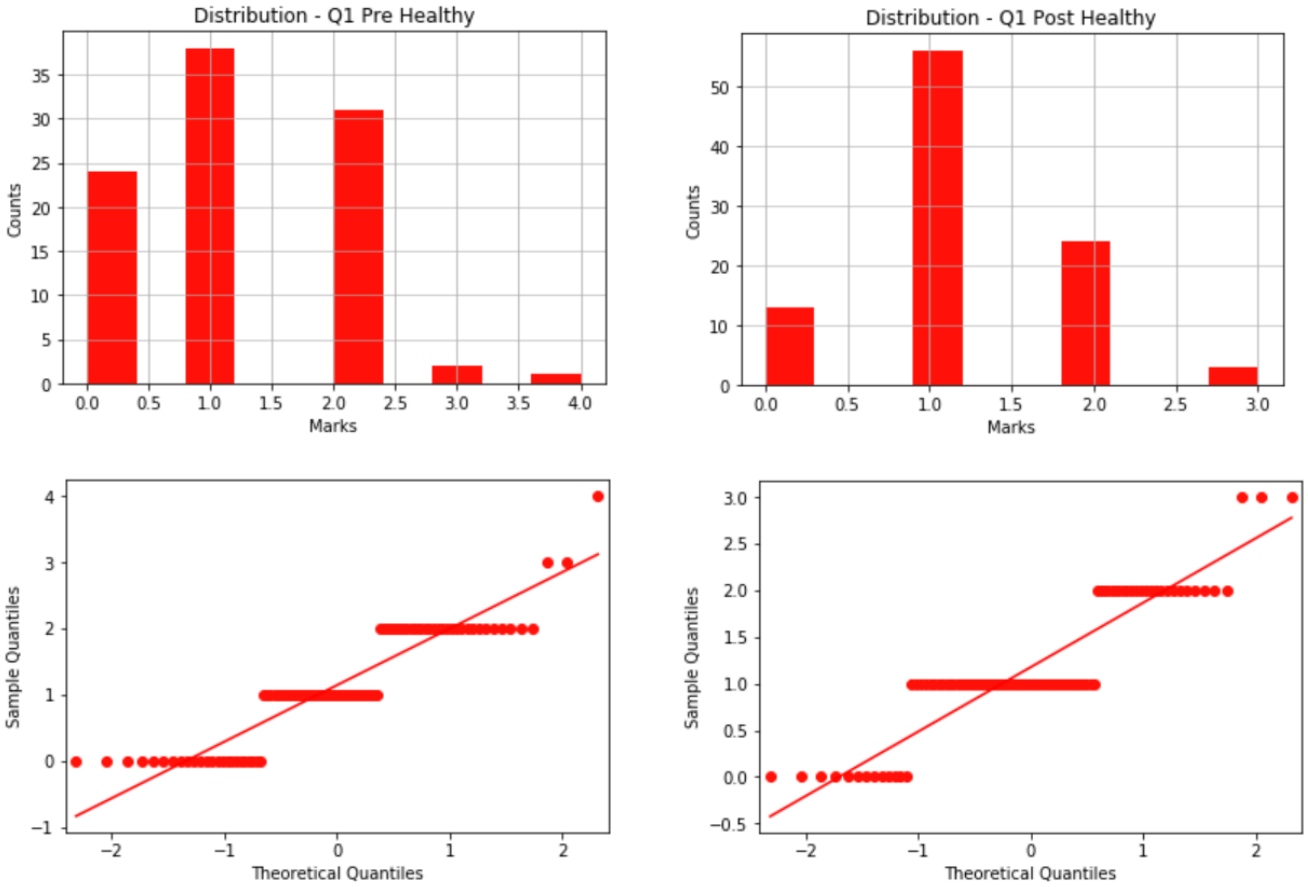


Figure D.2: Probability distributions and QQ plots unhealthy foods pre/post pilot (Q1)

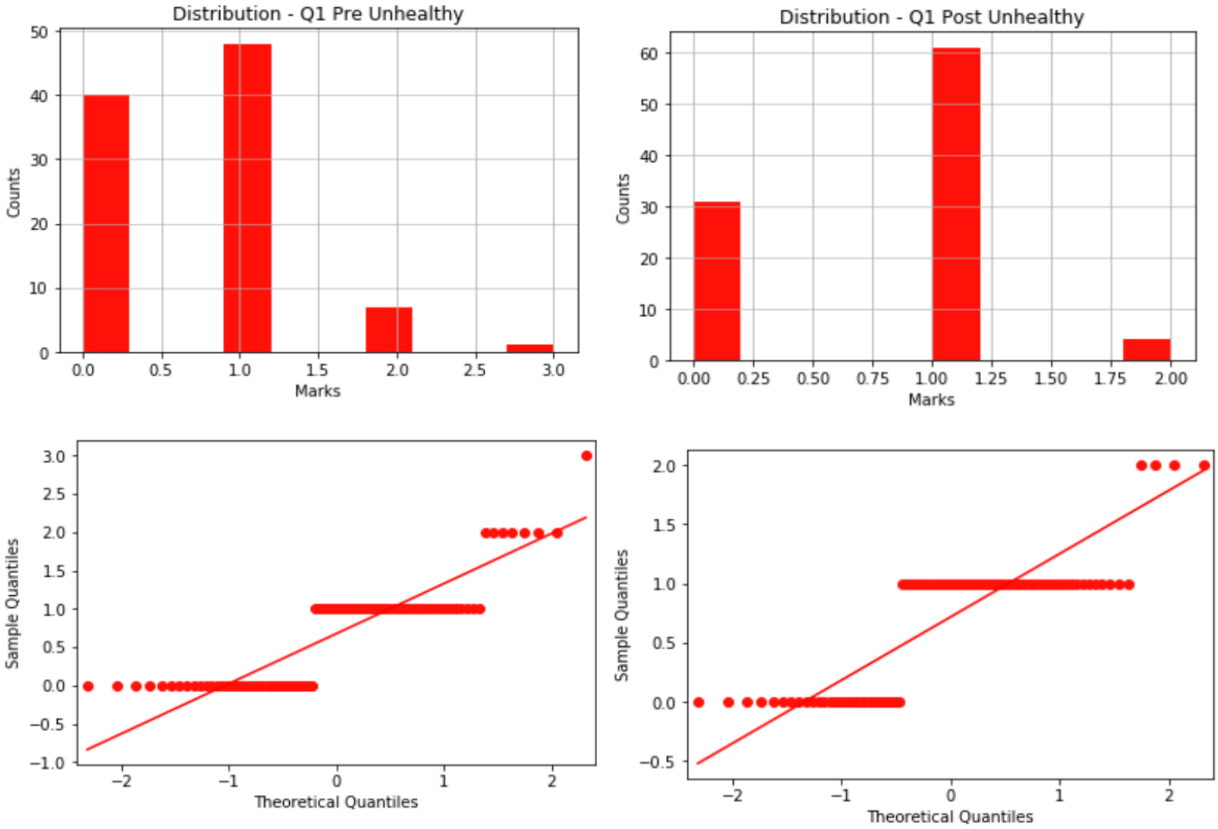


Figure D.3: Probability distributions and QQ plots healthy foods pre/post pilot (Q2)

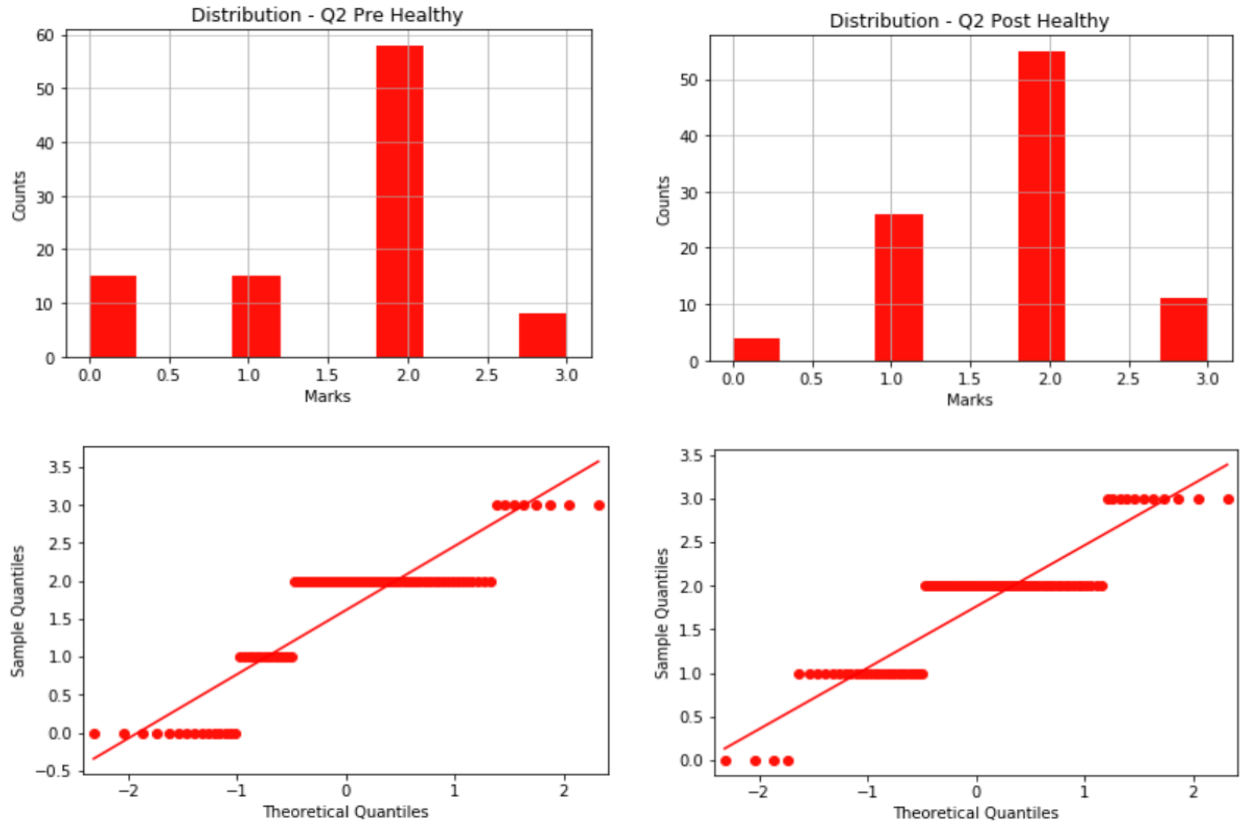
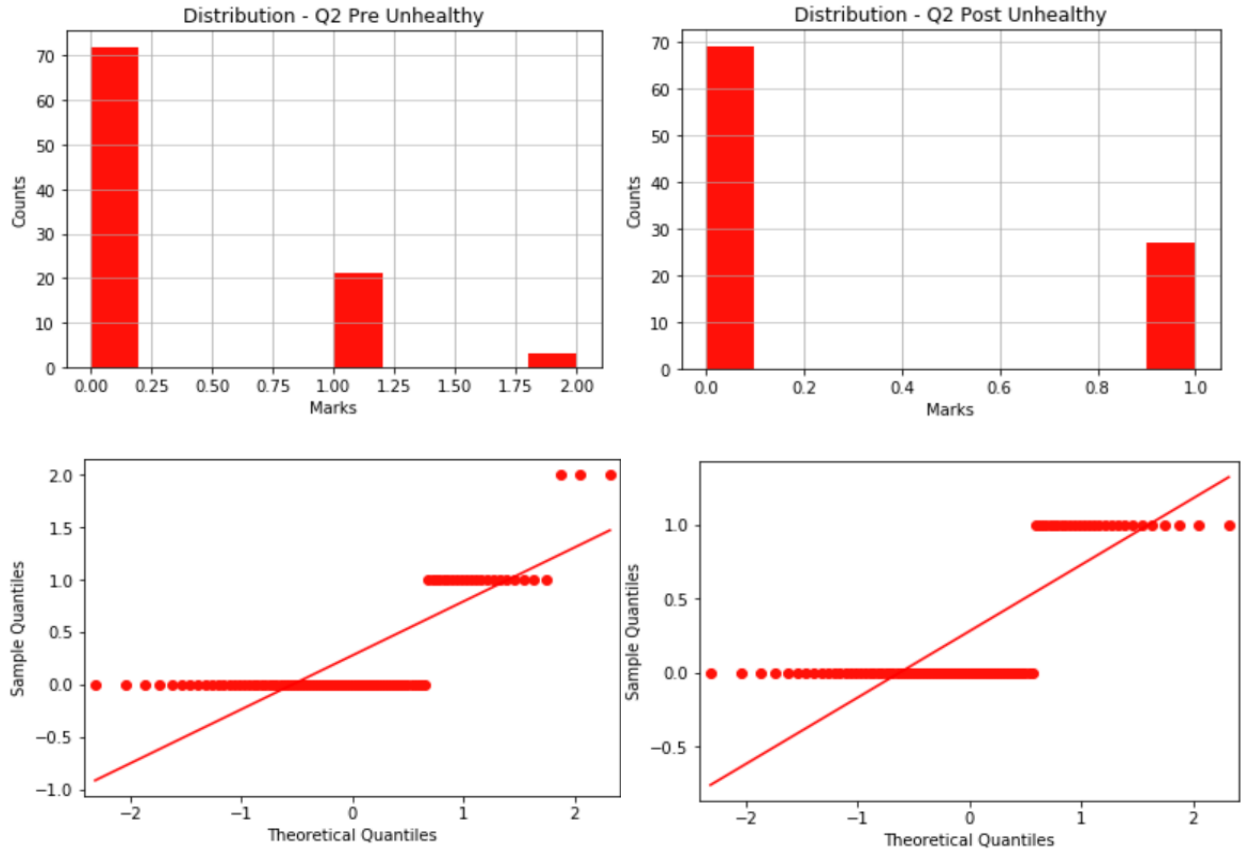


Figure D.4: Probability distributions and QQ plots unhealthy foods pre/post pilot (Q2)



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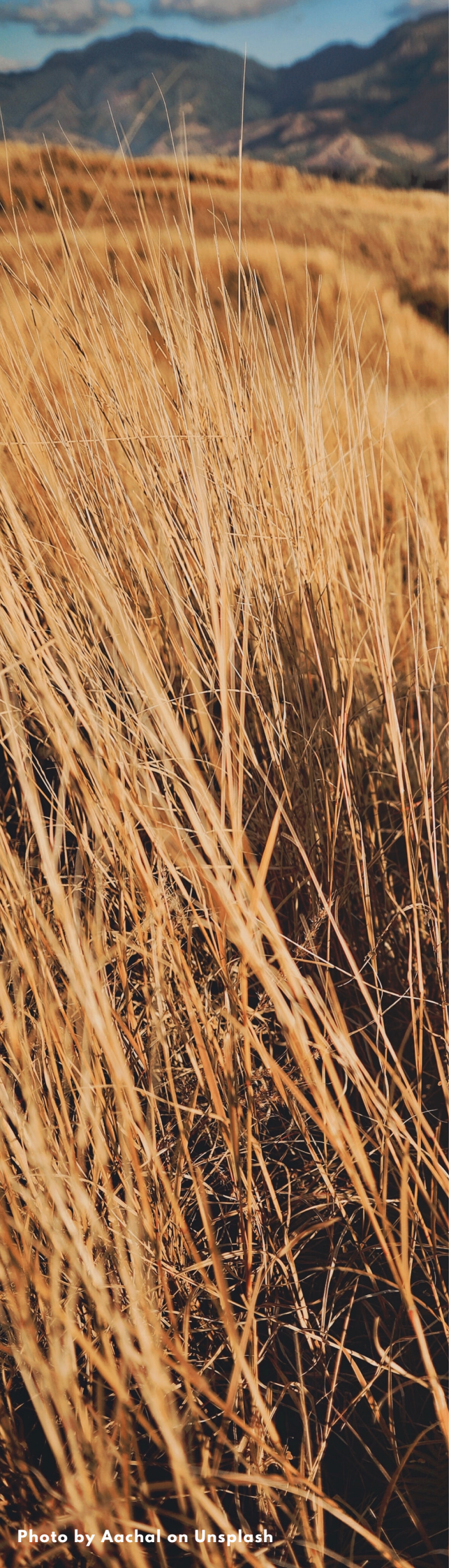

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