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Impact of Meal Ticketing on Students' Academic Performance and Well-Being in Havilla University, Nde-Ikom, Cross River State

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Abstract
This research utilizes primary data obtained from weekly sales meal tickets from HUNI cafeteria, students hospital bills, and GPA/CGPA (1st and 2nd semesters) covering a period of twelve months (9/11/2021 to 20/08/2022). Chi-square estimation, showed a significant relationship between the incidence of ill-health and feeding regime, $[\chi^{cal}(434.98) > \chi^{tab}_{0.05,9}(16.919)]$ with a $\mathrm{p-value} = 0.0000$. This implied that meal ticketing, students' academic performance and well-being are inter-dependent. The linear correlation is strongly/positively correlated (i.e., 1). Also, male students between the age bracket of 17 to 18 years were more prone to ill-health between first and second semesters when compared to the female students. This means that in the first semester (without a feeding regime) ill-health cases were higher than those recorded for the second semester (when feeding a regime was introduced). Hence, the analysis recommended that HUNI should encourage and continue with its meal ticketing policy to enhance students' academic performance and well-being. Also, government should be encouraged in the light of the above to institute a meal ticketing policy in tertiary institutions.
Keywords: Chi-square, Correlation, Academic performance, Meal ticketing

Introduction
The increasing knowledge of the importance of nutrition in the promotion of growth, good health, disease prevention as well as in the enhancement of general physiological and psychosocial well-being of man has led to a greater concern about the kind of food and the feeding patterns of man especially among students (Rola & Ahlam, 2021). Food can be characterized as any solid or liquid substance which when taken into the body supplies the body with chemical substances called nutrients, which are generally classified into six namely carbohydrates, proteins, lipids (fats), vitamins, minerals and water (Food, Nutrition and Health, 2020). Essentially, food is eaten for the purpose of gaining energy, growth repair, and as well as for the overall maintenance and regulation of various activities in the body.

The importance and benefits of food in the body have been documented. Reuter et al., (2022), reported that the cells in the human body got energy from food calories in the form of macronutrients from carbohydrates, protein, and fats. According to them the recommended total daily calories should include 45-65% of carbohydrate, 12-20% protein, and 20-25% from fat. Food reinforces the body with energy, vitamins, which are concern with processes that promote neuronal survival, and promote the synthesis of neurotransmitters which have to do with the efficient flow of information across synapses (Mudambi & Rajagopal, 2020). Deficiencies or excesses of certain micronutrients can lead to nerve damage in the brain, and thus bring about alterations in memory, impairment of brain function and reduction in the ability to solve problems (Food, Nutrition and Health, 2020). Vitamins and minerals are very essential in humans, even though they

are needed in small amount they help in the production of energy, gives support to the walls of the blood vessels, promote good vision, and bone formation and have antioxidant functions. The function of food as the overall nourishment of the body and promotion of healthy living can be achieved through proper dieting such as taking a balanced diet and eating regularly at normal mealtime otherwise malnutrition occurs (Sohail et al., 2022).

School feeding programmes have been lauded to be a viable social protection mechanism and an investment in social capital of the society (Solomon & Yusuf, 2022). School feeding contribute to student's readiness to learn and ability to participate in their educational processes. Poorly fed students are more prone to ill-health and stunted growth rate, weakness of the body system and inability to participate in their academic work (Radhika, 2022). That is, food and nutrition are regarded to render an important contribution in promoting health and well-being (Radhika, 2020). This is similar to the observation by Abd El Hakeem et al., (2015), who assesses that school feeding reduces hunger among the learners which improves their ability to concentrate in the classroom. More so, dietary examples such as omission or intake of breakfast can influence intellectual capacity and conduct in young people, meal patterns and nutrient composition can over the long-run apply to have helpful or adverse effects as these may connect with cognition (Reuter et al., 2020). Breakfast as a component of a heathy diet and way of life decidedly impacts children and students well-being and general prosperity, particularly supplements rich in fruits and dairy items (Egede, 2021). Students who eat a balance diet do better in their exams than those who do not. Similarly, nourished students show better performance as compared to malnourished students (Egede, 2021).

Jessica et al. (2019), found that high level of physical activity and taking daily main meals are directly related to improved performance in school and emphasize the essentialness of encouraging these habits among students. Rola & Ahlam (2021), revealed that students' score was better if their dietary intake was healthy and regular. Peter et al. (2020), conducted an online survey with 577 undergraduate universities in the US to find a relationship between their consumption habit and academic performance. They found that eating a healthy breakfast had a constructive consequence on self-reported GPA and that eating fast food had a negative outcome. Their overall conclusion was that a healthy diet has a constructive effect on the academic performance on students. A study conducted in Jamaica shows that school meals indeed improve the education of beneficiaries they found that school performance indicators such as enrollment, attendance, dropout rate, school attainment levels, and cognitive functions have all improved in response to school feeding habits.

In a global survey of school meal programs in Africa showing regional results from 2019 by Wineman et al (2022), detailed information on school feeding activities in each country was captured in the Global Survey of School Meal Programs which launched in 2019. Each government received an invitation to join, and they then designated a national respondent to compile data on every aspect of the nation's extensive school meal program. The study was completed in 2019 by 41 African nations, including 38 in sub-Saharan Africa. The responses included details on 68 extensive projects that collectively impacted 60.1 million children. The total budget for meals for schools in these nations was USD 1.3 billion. Regions, income levels, and degrees of national commitment all show diversity in school meal programs. Southern Africa, nations where school feeding is a line item in the national budget, and nations where the domestic part of the school feeding budget is higher tending to have the highest coverage rates. Programs that procured food through domestic purchases rather than relying on foreign in-kind donations tended to have the most diversity in their school menus. About two-thirds of the programs served fortified foods, and a quarter offered micronutrient supplements to combat micronutrient deficiency. Only 10% of school meal programs designated prevention of overweight/obesity as a goal, despite the fact that these conditions are becoming more prevalent among African schoolchildren. This concluded that a significant shift in favour of national ownership and local food procurement may be seen in how much domestic financing is used to support school meal programs in Africa. Programs have struggled with underfunded and unpredictable budgets, as well as issues with supply chains and logistics. These issues need to be resolved if these programs are to accomplish their goals. Overall, the survey's findings highlight the significant role that school meal

programs play in African food systems and their potential to sustainably enhance child nutrition, food security, and health.

In a review to determine impacts of school feeding on educational and health outcomes of school-age children and adolescents in low- and middle-income countries by Wang et al (2021), found that the percentage of school days attended increased significantly as a result of school feeding (2.6%; 95% CI=1.2%, 3.9%; P=0.001). In another study testing whether food fortified with multiple micronutrients provided in Food for Education (FFE) programs reduced anemia prevalence of primary-school-age adolescent girls, adult women, and preschool children in Uganda, results showed that adolescent girls aged 10-13 y in FFE schools experienced a significant ($P < 0.05$) 25.7 percentage point reduction (95% CI: −0.43, −0.08) in prevalence of any anemia [hemoglobin (Hb) <11.5 g/dL, age 10-11 y; Hb <12 g/dL, age 12-13 y] and a significant 19.5 percentage point reduction (95% CI: −0.35, −0.04) in moderate-to-severe anemia (Hb<11 g/dL) relative to the control group (Adelman et al., 2019).

In a study to evaluate the impact of a large-scale school meals program in Ghana on school-age children's anthropometry indicators by Gelli et al (2019), A longitudinal cluster randomized control trial was implemented across the 10 regions of Ghana, covering 2869 school-age children (aged 5–15 y). Communities were randomly assigned to 1) control group without intervention or 2) treatment group providing the reformed national school feeding program, providing 1 hot meal/d in public primary schools. Height-for-age (HAZ) and BMI-for-age (BAZ) z scores were the primary outcomes. The findings indicated that school meals had no impact on HAZ and BAZ in kids between the ages of 5 and 15. The school feeding intervention did, however, improve HAZ in 5- to 8-year-old children (effect size: 0.12 SDs), in girls (effect size: 0.12 SDs), particularly in girls aged 5-8 y living in the northern regions, and in children aged 5-8 y in households living below the poverty line (effect size: 0.22 SDs) in per-protocol subgroup analysis. Additionally, there was evidence that the intervention affected how food was distributed and shared among households. It was concluded that in the early years of primary school, school meals can serve as a foundation for scaling up nutrition interventions, with significant advantages accruing for more disadvantaged children (Gelli et al, 2019).

Statement of the Problem

Lack of proper feeding habits can cause ailments that range from mild gastric discomfort, through infections and diarrhea, to severe diseases such as diabetes, hypertension, cardiovascular disease, some forms of cancer, anemia, malnutrition, and starvation. Poor feeding habits lead to decreased mental capacity, and deficiencies in specific vitamins and minerals that can inhibit cognitive abilities and mental concentration. Many reasons have been presented to count for these deficiencies, and if nothing is done, our nation's dream of becoming a healthier nation will be a mirage.

School feeding programmes across most sub-Saharan African countries are focused on primary and secondary schools. Although there is literature on the advantages of school feeding on academic performance at these educational levels, there is a glaring research gap on how these programs could affect university students' academic performance, particularly in Nigeria.

It is important to assess how lifestyle factors especially feeding habits, affect students' academic performance at the college and the university level. As students of Havilla university Nde-Ikom moved from first semester 2021 academic year (without meal tickets regime), to the second semester 2022 academic year (with meal tickets), their feeding habits transformed as they adapted to new resources. Hence, this prompted the need to assess the effect of meal ticketing on the academic performance and health of students in HUNI.

This study intends to close the gap in school feeding programmes literature by examining the relationship between Nigerian university students' health and academic performance and their school feeding programme. Havilla University has an extensive school feeding program and all students reside on-campus and feed from the single-vendor cafeteria system.

Objectives of the Study

The broad objective of these research is to assess the impact of meal ticketing on students' academic performance and well-being in Havilla University, Nde-Ikom, Cross River State, Nigeria.

While the specific objectives are:

i. To determine the relationship between meal ticketing, students' academic performance and well-being in Havilla University.
ii. To assess students average scores before and after school feeding program (SFP), 2021/2022.
iii. To determine the health condition of students before and after school feeding program.

Hypotheses

The following two null hypotheses were tested at 0.05 significant levels:

H_O1: There is no statistically significant relationship between meal ticketing and students' academic performance

H_O2: There is no statistically significant relationship between meal ticketing and students' wellbeing

Methodology

For this study, the population involved sixteen (16) 200 level students of Havilla University, Nde Ikom, Cross River State, Nigeria. The research utilizes primary data obtained from weekly sales of meal tickets covering a period of twelve months ranging from 9th November, 2021 to 20th August, 2022, due to students' frequent visits to the hospital within period under review. Hospital bills from students' files and student GPA (first and second semester), for the analysis. Quantitative answers were analyzed using chi square statistic to check whether self-reveal meal tickets sold was connected with student examination performance and well-being, frequency and percentage methods was also utilized. The justification for this study is to analyze the impact of good meal on students' academic performance in Havilla University.

Model

To determine the impact of meal ticketing (feeding habit) on students' academic performance and well-being in Havilla University Nde-Ikom, Cross River State. The following empirical model was specified based on the objective of the study called chi square statistic for analysis of $r \times c$ table. Thus;

$$X^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(0ij - eij)^2}{eij} \quad (1)$$

Where $r = row,\ c = column,\ 0ij = observed\ frequencies, eij = expected\ frequencies\ denoted\ by$

$$eij = \frac{(ith\ row\ total) \times (jth\ column\ total)}{grand\ total} \quad (2)$$

And $v = (r-1)(c-1)\ degree\ of\ freedom$ (3)

To perform a chi square test, we then substitute into equation one and we reject the null hypothesis if the value of the calculated statistic X^2 exceed the tabulated value X_α^2 for $(r-1)(c-1)\ degree\ of\ freedom.$

Results and Discussion

Table 1: Demographic profile of the participants

		Frequency	Percentage %
Gender	Male Female	13 7	63.16 36.84
Total			100
Age (in years)	15-16 17-18 19-20 21 and above	1 10 3 5	5.26 52.63 15.79 26.32
Total			100

Source: HUNI Admission Record (2021/2022).

To determine whether there really is a relationship between meal ticketing, students' academic performance and well-being in HUNI, the researcher took a sample of 1769 cases from weekly tickets sold from cafeteria extensive files and obtained the results shown in Table 2.

Table 2: A summary of tickets sold per week.

Number of weeks

Sales per week	Week 1	Week 2	Week 3	Week 4	Total
Week 1	105	138	192	185	**620**
Week 2	59	152	52	140	**403**
Week 3	48	143	42	158	**391**
Week 4	170	168	13	4	**355**
Total	**382**	**601**	**299**	**487**	**1769**

Source: Research data (2021/2022)

$$e_{11} = \frac{620 \times 382}{1769} = 133.88, \quad e_{12} = \frac{620 \times 601}{1769} = 210.64 \quad e_{13} = \frac{620 \times 299}{1769} = 104.79$$

$$e_{14} = \frac{620 \times 487}{1769} = 170.68,$$

$$e_{21} = \frac{403 \times 382}{1769} = 87.02, \quad e_{22} = \frac{403 \times 601}{1769} = 136.92, \quad e_{23} = \frac{403 \times 299}{1769} = 68.12$$

$$e_{24} = \frac{403 \times 487}{1769} = 110.94$$

$$e_{31} = \frac{391 \times 382}{1769} = 84.43, \quad e_{32} = \frac{391 \times 601}{1769} = 132.84, \quad e_{33} = \frac{391 \times 299}{1769} = 66.09$$

$$e_{34} = \frac{391 \times 487}{1769} = 107.64$$

$$e_{41} = \frac{355 \times 382}{1769} = 76.66, \quad e_{42} = \frac{355 \times 601}{1769} = 120.61, \quad e_{43} = \frac{355 \times 299}{1769} = 60.00$$

$$e_{44} = \frac{355 \times 487}{1769} = 97.73$$

$$X^2 = \frac{(105 - 133.88)^2}{133.88} + \frac{(138 - 210.64)^2}{210.64} + \frac{(192 - 104.79)^2}{104.79} + \frac{(185 - 170.68)^2}{170.68} + \frac{(59.87.02)^2}{87.02} + \frac{(152 - 136.92)^2}{136.92} + \frac{(52.68.12)^2}{68.12} + \frac{(140 - 110.92)^2}{110.92} + \frac{(48 - 84.43)^2}{84.43} + \frac{(143 - 132.84)^2}{132.84} + \frac{(42 - 66.09)^2}{66.09} + \frac{(158 - 107.64)^2}{107.64} + \frac{(170 - 77.66)^2}{77.66} + \frac{(168 - 120.61)^2}{120.61} + \frac{(13 - 60.00)^2}{60.00} + \frac{(4 - 97.73)^2}{97.73}$$

$$X^2 = 6.23 + 25.05 + 72.58 + 1.20 + 9.02 + 1.66 + 3.81 + 7.62 + 15.72 + 0.78 + 8.78 + 23.56 + 113.64 + 18.62 + 36.82 + 89.89$$

$$X^2 = 434.98$$

Criterion

Degree of freedom at $\alpha = 0.05$,

$$v = (r - 1)(c - 1) = (4 - 1)(4 - 1) = 3 \times 3 = 9$$

$$\alpha_{0.05,9} = 16.919$$

Decision

Since$X^2 = 434.98\ exceeds\ X^2_{0.05,9} = 16.919$, we reject the null hypothesis, and conclude that meal ticketing, student academic performance and well-being (health outcome) are dependent.

Correlation

Correlation defines the relationship that exist between two variables. In this respect, we look at the relationship between meal ticket/academic performance and meal ticket/students well-being.

Let Meal ticket be denoted by X_{MTK}, Academic performance be denoted by Y_{ACP}, and let students well-being be denoted by Y_{SWB}.

Table 2: Summary analysis of Meal ticketing, Academic performance and Students well-being.

$Y_{SWB}(000)$	Y_{ACP}	X_{MTK}	$(Y_{SWB})^2$	$(Y_{ACP})^2$	$X_{MTK}Y_{SWB}$	$X_{MTK}Y_{ACP}$	$(X_{MTK})^2$
5	4.90	105	25	24.01	525	514.5	11025
5	4.82	138	25	23.23	690	665.16	19044
5	2.43	192	25	5.90	960	466.56	36864
5	4.73	185	25	22.37	925	875.05	34225
5	4.51	59	25	20.34	295	266.09	3481
5	3.77	152	25	14.21	760	573.04	23104
5	4.77	52	25	22.75	260	248.04	2704
7.7	5.59	140	59.29	31.25	1078	782.6	19600
5	4.72	48	25	22.28	240	226.56	2304
5	4.63	143	25	21.44	715	662.09	20449
3.5	4.75	42	12.25	22.56	147	199.5	1764
22.75	4.63	158	517.56	21.43	3594.5	731.54	24964
5	4.75	170	25	22.56	850	807.5	28900
26.43	3.70	168	698.54	13.69	4444.24	621.6	28224
5	2.66	13	25	7.08	65	34.58	169
23.95	2.10	4	573.60	4.41	95.8	8.4	16
TOTAL			2136.24	299.51	15645.54	7682.41	256837

Source: Researchers computation from research data (2021/2022)

Using product moment formula to estimate linear correlation coefficient. The model is given by;

$$r = \frac{\sum XY}{\sqrt{(\sum X^2)(\sum Y^2)}} \quad (4)$$

To estimate the correlation between Meal ticketing and Students Academic Performance; we have the model as

$$r = \frac{\sum X_{MTK}Y_{ACP}}{\sqrt{(\sum X^2_{MTK})(\sum Y^2_{ACP})}} \quad (5)$$

$$r = \frac{7682.41}{\sqrt{(256837)(299.51)}}$$

$$r = \frac{7682.41}{8770.70}$$

$$r = 0.8759 \approx 1.$$

∴ The correlation between meal ticketing and academic performance is positive.

To estimate the correlation between Meal ticketing and Students well-being;

$$r = \frac{\sum X_{MTK} Y_{SWB}}{\sqrt{(\sum X_{MTK}^2)(\sum Y_{SWB}^2)}} \quad (6)$$

$$r = \frac{15645.54}{\sqrt{(256837)(2136.24)}}$$

$$r = \frac{15645.54}{\sqrt{548665472.88}}$$

$$r = 0.6679 \approx 1$$

$\therefore$ *The* Correlation between meal ticketing and students well-being is positive.

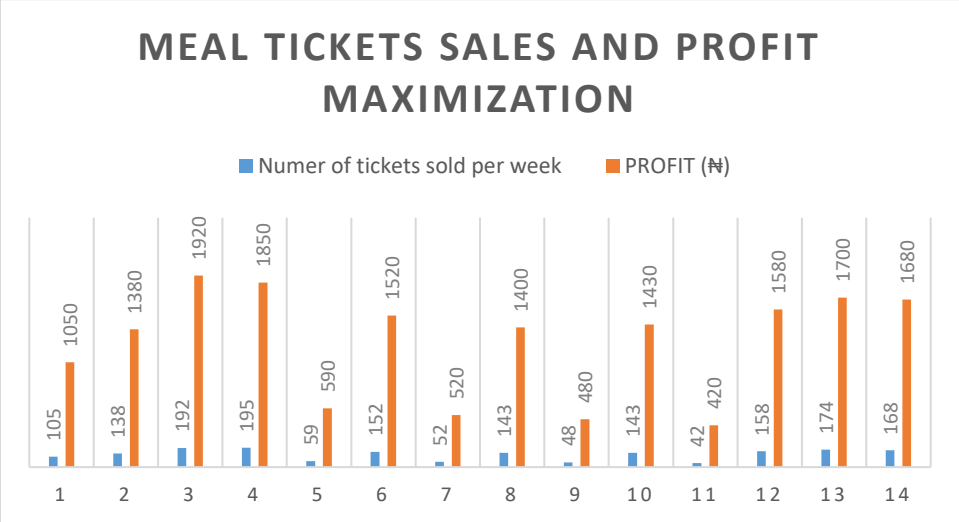

Figure 1: Sales/ profit maximization

Figure 1 shows the number of tickets sold and its profit margin. At 105 sales its profit was ₦1050, at a sale of 168 tickets the profit was ₦1680 etc. this means that the higher the number of sales, the higher the profit.

Table 3: Patient care demographic profile of students' health outcome for first semester.

		Frequency	Percentage	Cost ₦
Gender	Male Female	12 5	70.59 29.41	124,330 36,690
Age(in years)	15 – 16 17 – 18 19 – 20 21 and above	1 7 3 6	5.88 41.18 17.65 35.29	5,000 83,390 36,430 31,200
In-patient's	Male Female	2 1	66.67 33.33	73,130 19,990
Out-patient's	Male Female	9 4	69.23 30.77	46,200 16,700

Source: Researchers computation from research data (2021/2022)

At the upper part of table 3 above, the male gender had a frequency of 12 and cost of ₦124,330, and female gender with frequency of 5 and a cost of ₦36,690. This implies that the male students visited the hospital in first semester more than the female students.

At the middle part of the table, the aged bracket between 17 to 18 years where more prone to ill-health condition denoting a frequency of 7 and with an incurred cost of ₦83,390. At the lower part of the table,

the analysis shows that the in-patients (those admitted for treatment) exceeded the out patients who only visited the hospital for examination and for mile treatment.

Table 4: Patient care demographic profile for second semester 2022.

		Frequency	Percentage	Cost ₦
Gender	Male Female	1 2	33.33 66.67	5,000 29,360
Age (in years)	17 – 18 19 and above	2 1	66.67 33.33	12,860 21,500
Out-patients	Male Female	1 1	50 50	5,000 7,860
In-patients	Male Female	- 1	- 100	- 21,500

Source: Researchers computation from research data (2021/2022)

In table 4 above, the analysis shows that female gender with frequency 2 and a treatment cost of ₦29,360 visited the hospital most than the male. At the middle part of the table, aged bracket of 19 years and above is more significant i.e., mostly affected. And at the lower part, in-patients are significant incurring a cost of ₦21,500 to ₦12,860.

The ratio between student well-being in table 3 and 4, male: female is 12:2. This means that ill-health cases where recorded in first semester when there was no meal ticketing regime than second semester when meal ticket was introduced.

Table 5: A summary of academic performance in HUNI 2021/2022.

S/N	Faculty	Depart.	Age	Gender	1st sem. GPA	2nd sem. GPA	CGPA
1	Computing & sciences	Computer science	18	M	4.92	4.89	4.90
2	Computing & sciences	Computer science	19	M	4.68	4.96	4.82
3	Computing & sciences	Computer science	25	M	2.00	2.88	2.43
4	Computing & sciences	Computer science	19	M	4.68	4.83	4.76
5	Computing & sciences	Computer science	17	M	4.24	4.79	4.51
6	Computing & sciences	Biological sciences	23	F	3.60	3.96	3.77
7	Computing & sciences	Biological sciences	20	F	4.88	4.65	4.77
8	Computing & sciences	Computer science	23	M	4.24	4.96	4.59
9	Health sciences	Public health	24	F	4.62	4.80	4.72
10	Health sciences	Nursing	17	M	4.71	4.53	4.63
11	Health sciences	Nursing	21	F	4.89	4.61	4.75
12	Management & social sciences	Economics	19	F	3.56	3.82	3.70
13	Management & social sciences	Accounting	19	M	2.00	3.41	2.66
14	Management & social sciences	Human resource management	20	M	1.20	3.00	2.10
15	Management & social sciences	Human resource management	23	M	3.52	4.52	4.02
16	Management & social sciences	Human resource management	19	M	3.08	4.60	3.84

Source: HUNI Cafeteria Record (2021/2022).

The result in table 5, showed clearly the significant impact of meal ticketing on students' academic performance. The analysis found that a male student in the faculty of computing and sciences, department of computer science with aged 19 years outperformed others with a CGPA of 4.90. considering students 4, 5, and 6 in table 5 above the rates of improvement are 0.15, 0.55 and 0.36 and the percentage increase or effect on CGPA were 15%, 55%, and 36% respectively. This implies that the differences in GPAs between first and second semesters shows a corresponding increase in academic performance of students in HUNI with respect to meal ticketing policy.

Conclusion

It is pertinent that the food consumed is essential to form the mind-sets of individuals and render an important contribution in promoting health and well-being. However, as students migrates in their academic pursued their lifestyle changes as a result of hard work. Healthy diet becomes relevant to help them achieve higher academic performance. Hence, the value of chi square calculated ($\chi^2 = 434.98$ *exceeds the critical value* ($X^2_{0.05,9} = 16.919$), this shows that meal ticketing determines students' academic performance and well-being. The correlation between meal ticketing, academic performance and being is strongly/positively correlated i.e., 1. The result shows at first semester year 1, that male students where prone to ill-health than the females, with aged bracket of 17 to 18 years mostly affected. In-patients/cost were administered more than the out-patients. In table 4, year 1 second semester, the analysis shows that female students where more affected to ill-health condition with an age limit of 19 years and above mostly affected. More so, a student of the faculty of computing and sciences, department of computer sciences was the best student with a CGPA of 4.90. The differences in GPAs in first and second semesters shows the impact of meal ticketing on academic and students well-being in HUNI. It is then recommended that the government should encourage meal ticketing programs in tertiary institutions in other to enhance academic performance and well-being of students in the university level.

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