



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Implementation of Gulayan sa Paaralan Program (GPP) in Urban Schools and its Outcomes

Ysmael Herson Rellera

Laguna State Polytechnic University – San Pablo City Campus, San Pablo City, Laguna, 4000, Philippines

Faculty, College of Teacher Education, Graduate Studies of Applied Research, Laguna State Polytechnic University – San Pablo City Campus, San Pablo City, Laguna, 4000, Philippines

ABSTRACT

This study aimed to examine the implementation of the Gulayan sa Paaralan Program (GPP) in urban schools within the Division of San Pablo City, with a specific focus on its challenges, best practices, and outcomes. Utilizing a descriptive-correlational research design, the study involved a purposive sample of 54 respondents, including students, teachers, and school heads, from seven selected urban schools. It sought to assess the level of GPP implementation, identify challenges encountered during execution, and determine the relationship between the extent of best practice application and the resulting program outcomes. The data were analyzed using mean, standard deviation, and Pearson's r . The findings indicated that the implementation of GPP was generally positive across key areas, such as the Attainment of Program Goals, Stakeholder Involvement, and Resource Availability. However, challenges such as constraints in planting areas, inadequate funding, and the need for improved Stakeholder Involvement and Training were identified. Moreover, the study found significant positive correlations between the application of best practices and the program's outcomes, including Efficiency, Participation, Engagement, Farm Sustainability, and Relevance.

Keywords: Gulayan sa Paaralan, Assessment, Challenges and Successes

1. Introduction

The integration of farming into school curricula offers significant benefits, fostering both individual development and societal welfare. This practice enhances student learning while promoting awareness of food systems, sustainability, and environmental stewardship (Newton & Simos, 2024). One initiative that embodies these ideals is the Gulayan sa Paaralan Program (GPP), launched by the Department of Education in collaboration with the Department of Agriculture. Through vegetable gardening, GPP aims to supplement student nutrition, provide alternative learning experiences, and cultivate awareness of sustainable farming practices (DepEd Memorandum No. 293, s. 2007). However, the implementation of GPP in urban schools faces distinct challenges, particularly due to space constraints, dense infrastructure, and limited resources. For example, studies have shown that in Metro Manila alone, green spaces constitute 21% of the total land area, posing significant barriers to school gardening projects (Enano, 2019).

Urban schools also grapple with uneven levels of GPP implementation, primarily due to inconsistent access to planting areas, insufficient funding for materials and maintenance, and varying levels of stakeholder engagement. Moreover, urban schools often prioritize academic performance, leaving extracurricular initiatives like GPP underfunded and underutilized. These factors necessitate innovative strategies tailored to urban contexts, including vertical gardening, container planting, and increased stakeholder involvement to maximize the program's potential despite space limitations.

This study examined the challenges and opportunities associated with GPP implementation in urban schools within the Division of San Pablo City. It specifically evaluated the level of program implementation, including the attainment of goals, curriculum integration, stakeholder involvement, and resource availability. Additionally, the study investigated the application of best practices such as sustainable farming techniques, stakeholder engagement, innovation, and health and safety protocols. It further explored perceived challenges, including issues related to planting areas, funding, stakeholder participation, and training. Finally, it assessed the outcomes of GPP in terms of efficiency, participation, engagement, sustainability, and relevance, while analyzing the relationships among implementation levels, best practices, challenges, and outcomes.

The findings of this research will be instrumental in identifying key factors that influence the success of GPP in urban schools. By addressing the unique challenges of urban contexts, this study aimed to provide practical recommendations to enhance GPP implementation, contributing to the broader goals of food security and environmental education. Furthermore, this research will fill a critical gap in the academic literature on school-based urban agriculture in the Philippines, serving as a valuable resource for educators, policymakers, and stakeholders striving to optimize GPP across diverse school settings.

1.1 Statement of the Problem

This study aimed to explore the challenges and opportunities associated with implementing the Gulayan sa Paaralan Program (GPP) in urban schools within the Division of San Pablo City.

Specifically, it sought to answer the following questions:

1. What is the level of GPP implementation in terms of:
 - 1.1. attainment of program goals and objectives;
 - 1.2. integration in the school curriculum;
 - 1.3. stakeholder involvement; and
 - 1.4. Availability of resources?
2. What is the extent of application of GPP best practices in terms of:
 - 2.1. sustainable farming techniques;
 - 2.2. stakeholder engagement;
 - 2.3. innovation; and
 - 2.4. health and safety practices?
3. How do the respondents perceive the issues and challenges of GPP Implementation within their schools in terms of:
 - 3.1. planting area;
 - 3.2. funding and resources;
 - 3.3. stakeholder involvement; and
 - 3.4. training and knowledge?
4. How do the respondents perceive the GPP outcomes in terms of
 - 4.1. efficiency;
 - 4.2. participation;
 - 4.3. engagements;
 - 4.4. farm sustainability; and
 - 4.5. relevance?
5. Is the level of GPP implementation significantly related to GPP outcomes?
6. Are the issues and challenges of GPP significantly related to GPP outcomes?
7. Is the extent of application of GPP best practices significantly related to GPP outcomes?

2. Methods

2.1 Research Design

This study used a descriptive-correlational research design in studying challenges and opportunities in implementing the Gulayan sa Paaralan Program (GPP) for urban schools in the Division of San Pablo City. A descriptive correlational design is a research study where the researcher seeks to describe a relationship among variables, without attempting to infer a causal relationship (Devi et al., 2023). It analyzed through the descriptive aspect the level of GPP implementation, the extent of best practices application, and the perceived issues and challenges. The correlational component investigated the relationship between the said independent variables on the outcomes of GPP.

2.2 Respondents of the Study

The participants of the study were from the seven (7) identified schools situated in urban areas, defined as those located within highly populated districts characterized by limited agricultural land and significant space constraints. The sample consisted of seven (7) administrators, seven (7) teachers, and forty (40) students directly involved in implementing the Gulayan sa Paaralan Program (GPP) in their respective schools. Specifically, administrators

responsible for overseeing GPP activities, teachers serving as program coordinators or facilitators, and students participating in the program's activities were included.

Table 1 - Distribution of Respondents per Identified Urban School.

School	Administrator	Teacher	Student
San Pablo City Integrated High School	1	1	6
Col. Lauro D. Dizon Memorial National High School	1	1	6
San Vicente Integrated High School	1	1	6
Del Remedio National High School	1	1	5
San Jose National High School	1	1	5
Crecencia Drusila Lopez Senior High School	1	1	6
Felix Amante Senior High School	1	1	6
Total	7	7	40

A purposive sampling method was employed to select a total of fifty-four (54) participants, comprising seven (7) administrators, seven (7) teachers, and forty (40) students. This non-probability sampling technique ensured the selection of individuals who meet the specific criteria relevant to the research objectives, as defined by their direct involvement and roles in the GPP implementation process (Hassan, 2024)

2.3. Research Instrument

The instrument of the study was a researcher-designed questionnaire (Appendix E), carefully designed to collect data relevant to the study's variables. The questionnaire was divided into sections corresponding to the following variables: (1) The Level of Implementation of the Gulayan sa Paaralan Program (GPP), (2) The Extent of Application of GPP Best Practices, (3) The Issues and Challenges in GPP Implementation, and (4) The Perception of Respondents on GPP Outcomes.

To ensure content validity, the questionnaire underwent a rigorous validation process by a panel of experts consisting of Master Teachers, Head Teachers, and Teacher III. These experts evaluated the instrument based on its clarity, relevance, and alignment with the study's objectives. Feedback and recommendations were incorporated to refine the instrument further.

The questionnaire also underwent pilot testing involving a small sample of 40 respondents from urban schools not included in the main study. This process helped identify ambiguities, assess the comprehensiveness of the items, and ensure that the instrument is practical and understandable for the target participants. Reliability was tested using Cronbach's Alpha to measure the internal consistency of the instrument.

2.4. Research Procedure

Upon securing permission from the dean to conduct the study, the researcher forwarded a letter of permit (Appendix A) to the Schools Division Superintendent through the Secondary Cluster Public Schools District Supervisors of the participating schools. Upon approval, the letter was endorsed to the school heads of the identified secondary schools.

To ensure ethical compliance, an informed consent procedure was followed. All participants received a consent form (Appendix C) detailing the study's purpose, the voluntary nature of their participation, the confidentiality of their responses, and their right to withdraw at any time without consequences. Only those who provided written consent were included in the study.

To protect data security, all collected data were anonymized by assigning unique codes to respondents, ensuring their identities are not linked to their responses. The data were stored in a password-protected digital file, accessible only to the researcher, and all hard copies of questionnaires were securely stored and disposed of after the study's completion.

To address potential low response rates, follow-up reminders were sent to participants who did not respond within a week of receiving the questionnaire. If the response rate remains insufficient, additional participants from schools meeting the same inclusion criteria were invited to ensure an adequate sample size.

Quality control measures were also implemented throughout the process. These include pre-testing the questionnaire during the pilot phase, providing clear instructions for completing the survey, and double-checking data for consistency and completeness during retrieval. After a week, all completed questionnaires were collected, and the responses were systematically reviewed and extracted for analysis.

2.5. Statistical Treatment of Data

Mean scores and standard deviation were used to summarize the Level of Implementation of Gulayan sa Paaralan Program, the extent of application of GPP best practices, the issues and challenges in GPP Implementation, and the Perception of the respondents on the GPP Outcomes.

To determine whether there exists a significant relationship between the Level of Implementation of Gulayan sa Paaralan Program, the extent of application of GPP best practices, the issues and challenges in GPP Implementation, and the Perception of the respondents on the GPP Outcomes, Pearson's r was used at a 0.05 level of significance.

3. Findings

The study explored the challenges and opportunities in implementing the Gulayan sa Paaralan Program (GPP) in urban schools within the Division of San Pablo City. The following findings were drawn from the gathered data:

The implementation of the GPP was generally perceived positively across multiple dimensions. The program's goals and objectives are being achieved, demonstrating that schools are able to fulfill the intended outcomes of the initiative. Gardening activities are well integrated into the school curriculum, indicating that GPP is being used not just as a co-curricular activity, but as a meaningful instructional tool. There is consistent stakeholder involvement, showing that members of the school community and external partners play an active role in supporting the program. Essential resources, such as tools, planting materials, and infrastructure, are also sufficiently available, helping ensure the continuity and sustainability of school-based gardening.

Best practices associated with the GPP are widely applied in participating schools. Sustainable farming techniques are commonly used, reflecting a strong commitment to eco-friendly and long-term agricultural methods. Stakeholder engagement is actively pursued, underscoring the importance of community involvement in program success. Innovation is evident in many schools, where creative and adaptive strategies are employed to enhance GPP implementation. Schools also show a strong focus on health and safety, ensuring a safe environment for students and staff participating in gardening activities.

Despite these strengths, several challenges persist. Limited planting space is a frequent issue, especially in densely populated urban settings. Financial and material support, while present, still requires strengthening to meet all program needs. While stakeholders are involved, there is room for broader and more consistent participation, particularly from parents and community organizations. Another critical concern is the need for more training and capacity-building activities for teachers and coordinators, which would help improve both the technical and pedagogical aspects of the program.

Respondents viewed the outcomes of the GPP favorably. The program is perceived as efficient, with room for continued refinement. Student and community participation is strong, and interactions among stakeholders are vibrant and productive. The program is seen as sustainable and relevant, supporting both educational objectives and broader community goals, such as food security and environmental awareness.

The study also identified key relationships between the quality of implementation and program outcomes. Active stakeholder involvement plays a pivotal role in enhancing both sustainability and operational efficiency. Integrating GPP into the school curriculum supports its relevance and long-term viability. Adequate resource availability contributes significantly to engagement and sustained farming practices. While goal attainment contributes to outcomes, it is less influential compared to factors like stakeholder engagement and curriculum integration.

Challenges such as funding, stakeholder involvement, and training are also closely linked to program outcomes. Adequate support in these areas enhances program efficiency, participation, and overall engagement. Conversely, limitations in space, while notable, have a relatively less direct impact on program outcomes.

Finally, the consistent application of GPP best practices—such as stakeholder engagement, health and safety protocols, sustainable farming, and innovation—correlates with enhanced levels of student and community participation, program relevance, and sustainability. These practices help foster a sense of ownership, promote active involvement, and ensure the program's alignment with both local needs and global agricultural trends.

4. Conclusions

Most implementation indicators show significant positive correlations with the outcomes, especially Stakeholder Involvement, Integration in Curriculum, and Resource Availability. Only the Attainment of Program Goals and Objectives shows limited significant impact, being correlated only with Farm Sustainability. Therefore, the null hypothesis is partially sustained.

The Planning Area does not show any significant correlation with the GPP outcomes. Funding and Resources is not significantly correlated with Farm Sustainability, while Stakeholder Involvement lacks a significant relationship with Participation. Similarly, Training and Knowledge does not significantly correlate with Efficiency and Engagements. However, Training and Knowledge shows significant correlations with Participation, Farm Sustainability, and Relevance. Among all the issues, Funding and Resources stands out as the most consistently significant factor across outcomes—especially in relation to Relevance and Engagements. Thus, the null hypothesis is partially sustained.

Sustainable Farming Techniques show significant correlations with Participation, Engagements, Farm Sustainability, and Relevance, but not with Efficiency. Stakeholder Engagement is significantly correlated with Participation, Engagements, and Relevance, but not with Efficiency or Farm

Sustainability. Innovation demonstrates a significant relationship only with Participation and Relevance, while its correlations with Efficiency, Engagements, and Farm Sustainability are not significant. Health and Safety Practices are significantly correlated with Participation, Engagements, Farm Sustainability, and Relevance, but not with Efficiency. Among all best practices, Health and Safety Practices and Sustainable Farming Techniques are the most consistently significant across multiple outcomes, particularly in Participation, Engagements, and Relevance. Hence, the null hypothesis is partially sustained.

References

- Abu-Ouf, Noran M., & Jan, M. M. (2015). The impact of maternal iron deficiency and iron deficiency anemia on a child's health. *Saudi Medical Journal*, 36, 146 - 149. <http://doi.org/10.15537/smj.2015.2.10289>
- Akseer, N., Kandru, Goutham., Keats, E., & Bhutta, Z. (2020). COVID-19 pandemic and mitigation strategies: implications for maternal and child health and nutrition. *The American Journal of Clinical Nutrition*, 112, 251 - 256. <http://doi.org/10.1093/ajcn/nqaa171>
- Alibrandi, Marsha. (2012). International Perspectives on Teaching and Learning with GIS in Secondary Schools, 1. <http://doi.org/10.1007/978-94-007-2120-3>
- Alvaira, W., Bello, E., Cueva, L., Daguman, H., Del Rosario, N., and Jayona, A. (2022). Metro Police: An Analysis of Metro Manila's Impediments from and Progress towards Sustainable Urban Development
- Baog, I., Gonzales, C., Sanz-Gonzales, G., Buenaflor, D. (2023). The Effectiveness of the Gulayan sa Paaralan Program as Perceived by Junior High School Students in Davao City. *International Journal of Research Publications*, 127(1). DOI:10.47119/IJRP1001271620235051
- Bevans, K., Sanchez, B., Teneralli, R., & Forrest, C. (2011). Children's eating behavior: the importance of nutrition standards for foods in schools. *The Journal of school health*, 817, 424-9. <http://doi.org/10.1111/j.1746-1561.2011.00611.x>
- Cuaba, J. (2024). Addressing the Challenges in Implementing the Gulayan sa Paaralan Initiatives. *International Advanced Research Journal in Science, Engineering and Technology*. ISSN (O) 2393-8021, ISSN (P) 2394-1588, 11, 4.
- Davis, J. N., Spaniol, M., & Somerset, S. (2015). Sustenance and sustainability: maximizing the impact of school gardens on health outcomes. *Public Health Nutrition*, 18, 2358 - 2367. <http://doi.org/10.1017/S1368980015000221>
- DepEd Memorandum No. 293, s. 2007. Gulayan sa Paaralan. https://www.deped.gov.ph/wp-content/uploads/2018/10/DM_s2007_293.pdf
- Devi, B., Lepcha, N., and Basnet, S. (2023). Application of Correlational Research Design In Nursing and Medical Research. *Journal of Xi'an Shiyong University* 65(11):60-69. DOI:10.17605/OSF.IO/YRZ68
- Dhanaraju, M., Chenniappan, Poongodi., Ramalingam, Kumaraperumal., Pazhanivelan, S., & Kaliaperumal, R. (2022). Smart Farming: Internet of Things (IoT)-Based Sustainable Agriculture. *Agriculture*. <http://doi.org/10.3390/agriculture12101745>
- Diaz, J., Warner, L., Webb, S., and Barry, D. (2018). Obstacles for school garden program success: Expert consensus to inform policy and practice. Expert consensus to inform policy and practice, *Applied Environmental Education & Communication*. DOI: 10.1080/1533015X.2018.1450170
- Dogelio, M. (2019). Gulayan sa Paaralan": A Basis for a Sustainable Development Program. *Ascendens Asia Journal of Multidisciplinary Research Abstracts*, 2, 2C. <https://ojs.aaresearchindex.com/index.php/AJMR/article/view/4754>
- Dona, Chethika Gunasiri Wadumestrigi., Mohan, G., & Fukushi, K. (2021). Promoting Urban Agriculture and Its Opportunities and Challenges—A Global Review. *Sustainability*. <http://doi.org/10.3390/su13179609>
- Dorr, E., Sanyé-Mengual, E., Gabrielle, B., Grard, Baptiste., & Aubry, C. (2017). Proper selection of substrates and crops enhances the sustainability of Paris rooftop garden. *Agronomy for Sustainable Development*, 37, 1-11. <http://doi.org/10.1007/s13593-017-0459-1>
- Enano, J. O. (2019). Metro Manila's green spaces continue to shrink | Inquirer News. *INQUIRER.net*. <https://newsinfo.inquirer.net/1133654/metro-manilas-green-spaces-continue-to-shrink>
- Febriana, M., Nurkamto, J., Rochsantiningsih, Dewi., & Muhtia, Anggri. (2018). Teaching in Rural Indonesian Schools: Teachers' Challenges. *International Journal of Multicultural and Multireligious Understanding*. <http://doi.org/10.18415/IJMMU.V5I5.305>
- Feenstra, G., & Ohmart, Jeri. (2012). The evolution of the School Food and Farm to School Movement in the United States: connecting childhood health, farms, and communities. *Childhood obesity*, 84, 280-9. <http://doi.org/10.1089/chi.2012.0023>
- Francis, Charles., Jordan, Nicholas R., Porter, Paul M., Breland, T. A., Lieblein, G., Salomonsson, L., Sriskandarajah, N., Wiedenhoeft, M., Dehaan, R., Braden, I., & Langer, V. (2011). Innovative Education in Agroecology: Experiential Learning for Sustainable Agriculture. *Critical Reviews in Plant Sciences*, 30, 226 - 237. <http://doi.org/10.1080/07352689.2011.554497>
- George, T. (2023). Mixed Methods Research | Definition, Guide & Examples. <https://www.scribbr.com/methodology/mixed-methods-research/#:~:text=In%20an%20explanatory%20sequential%20design%2C%20your%20quantitative%20data,data%20will%20explain%20and%20contextualize%20your%20quantitative%20findings.>

- Gibbs, L., Staiger, P., Johnson, Britt., Block, K., Macfarlane, S., Gold, Kulas, J., Townsend, M., Long, Caroline., & Ukoumunne, O. (2013). Expanding children's food experiences: the impact of a school-based kitchen garden program. *Journal of nutrition education and behavior*, 45 2, 137-46. <http://doi.org/10.1016/j.jneb.2012.09.004>
- Goldstein, B., Hauschild, M., Fernández, J., & Birkved, M. (2016). Urban versus conventional agriculture, taxonomy of resource profiles: a review. *Agronomy for Sustainable Development*, 36, 1-19. <http://doi.org/10.1007/s13593-015-0348-4>
- Hammarsten, M., Askerlund, P., Almers, Ellen., Avery, Helen., & Samuelsson, Tobias. (2018). Developing ecological literacy in a forest garden: children's perspectives. *Journal of Adventure Education and Outdoor Learning*, 19, 227 - 241. <http://doi.org/10.1080/14729679.2018.1517371>
- Hannah, S., & Carpenter-Song, E. (2013). Patrolling Your Blind Spots: Introspection and Public Catharsis in a Medical School Faculty Development Course to Reduce Unconscious Bias in Medicine. *Culture, Medicine, and Psychiatry*, 37, 314 - 339. <http://doi.org/10.1007/s11013-013-9320-4>
- Harris, Diane M., Lott, M., Lakins, Velma, Bowden, Brian, & Kimmons, J. (2012). Farm to institution: creating access to healthy local and regional foods. *Advances in nutrition*, 33, 343-9. <http://doi.org/10.3945/an.111.001677>
- Hassan, M. (2024). Purposive Sampling – Methods, Types and Examples. <https://researchmethod.net/purposive-sampling/>
- He, J. (2015). Farming of Vegetables in Space-Limited Environments. *COSMOS*, 11, 21-36. <http://doi.org/10.1142/S0219607715500020>
- Ibanez, R. Y., Velza, J. F. P., Castillo, I. B., & Bartolay, R. A. (2022). Status of Gulayan Sa Paaralan (School Garden) Program in Public Elementary and Secondary Schools of Cawayan, Masbate, Philippines: Basis for Extension Activities. *International Journal of Multidisciplinary: Applied Business and Education Research*. 3(12), 2574 – 2588. doi: 10.11594/ijmaber.03.12.11
- Jaenke, Rachael, Collins, C., Morgan, P., Lubans, D., Saunders, Kristen L., & Warren, J.. (2012). The Impact of a School Garden and Cooking Program on Boys' and Girls' Fruit and Vegetable Preferences, Taste Rating, and Intake. *Health Education & Behavior* , 39 , 131 - 141 . <http://doi.org/10.1177/1090198111408301>
- Jernigan, V.B.B., D'Amico, E., Duran, B., & Buchwald, D. (2020). Multilevel and Community-Level Interventions with Native Americans: Challenges and Opportunities. *Prevention Science*, 21, 65-73. <http://doi.org/10.1007/s11121-018-0916-3>
- Kalantari, F., Tahir, O. M., Joni, R. A., & Fatemi, Ezaz. (2018). Opportunities and Challenges in Sustainability of Vertical Farming: A Review. *Journal of Landscape Ecology*, 11, 35 - 60. <http://doi.org/10.1515/jlecol-2017-0016>
- Kalantari, F., Tahir, Osman Mohd, Lahijani, Ahmad Mahmoudi, & Kalantari, S. (2017). A Review of Vertical Farming Technology: A Guide for Implementation of Building Integrated Agriculture in Cities. *Advanced Engineering Forum*, 24, 76 - 91. <http://doi.org/10.4028/www.scientific.net/AEF.24.76>
- König, B., Junge, R., Bittsánszky, A., Villarroel, M., & Kőmíves, T. (2016). On the sustainability of aquaponics., 2, 26-32. <http://doi.org/10.19040/ECOCYCLES.V211.50>
- Labonté, M., Poon, T., Gladanac, B., Ahmed, Mavra., Franco-Arellano, Beatriz., Rayner, M., & L'Abbé, M. (2018). Nutrient Profile Models with Applications in Government-Led Nutrition Policies Aimed at Health Promotion and Noncommunicable Disease Prevention: A Systematic Review. *Advances in nutrition*, 96, 741-788. <http://doi.org/10.1093/advances/nmy045>
- Laborde, D., Martin, W., Swinnen, J., & Vos, R. (2020). COVID-19 risks to global food security. *Science*, 369, 500 - 502. <http://doi.org/10.1126/science.abc4765>
- Lacuarin, N., Dapilos, L., Alvara, M., et.al. (2022). Gulayan sa Paaralan and Its Implication to Learners' Nutritional Status and Academic Performance. *PUPIL International Journal of Teaching Education and Learning*. <https://www.grdspublishing.org/index.php/PUPIL>
- Langellotto, G., & Gupta, Abha. (2012). Gardening Increases Vegetable Consumption in School-aged Children: A Meta-analytical Synthesis. *Horttechnology*, 22, 430-445. <http://doi.org/10.21273/HORTTECH.22.4.430>
- Lippevelde, W., Verloigne, M., Bourdeaudhuij, I., Brug, J., Bjelland, M., Lien, N., & Maes, L. (2012). Does parental involvement make a difference in school-based nutrition and physical activity interventions? A systematic review of randomized controlled trials. *International Journal of Public Health*, 57, 673-678. <http://doi.org/10.1007/s00038-012-0335-3>
- Martellozzo, Federico., Landry, J., Plouffe, D., Seufert, V., Rowhani, P., & Ramankutty, N. (2014). Urban agriculture: a global analysis of the space constraint to meet urban vegetable demand. *Environmental Research Letters*, 9. <http://doi.org/10.1088/1748-9326/9/6/064025>
- Martin, M., & Molin, E. (2019). Environmental Assessment of an Urban Vertical Hydroponic Farming System in Sweden. *Sustainability*. <http://doi.org/10.3390/SU11154124>
- McLoughlin, G., McCarthy, Julia, McGuirt, Jared T., Singleton, C., Dunn, C., & Gadhoke, P. (2020). Addressing Food Insecurity through a Health Equity Lens: A Case Study of Large Urban School Districts during the COVID-19 Pandemic. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 97, 759 - 775. <http://doi.org/10.1007/s11524-020-00476-0>

- Morgan, P., Warren, J., Lubans, D., Saunders, Kristen L., Quick, G. N., & Collins, C.. (2010). The impact of nutrition education with and without a school garden on knowledge, vegetable intake and preferences, and quality of school life among primary-school students. *Public Health Nutrition*, 13, 1931 - 1940. <http://doi.org/10.1017/S1368980010000959>
- Mozaffarian, D., Angell, S., Lang, T., & Rivera, J. (2018). Role of government policy in nutrition—barriers to and opportunities for healthier eating. *The BMJ*, 361. <http://doi.org/10.1136/bmj.k2426>
- Narayan, J., John, D., & Ramadas, N. (2018). Malnutrition in India: status and government initiatives. *Journal of Public Health Policy*, 40, 126 - 141. <http://doi.org/10.1057/s41271-018-0149-5>
- Newton, E. and Simos, N. (2024). How Can Schools Integrate Agriculture Education Into Their Curriculum? <https://www.agritecture.com/blog/how-can-schools-integrate-agriculture-education-into-their-curriculum>.
- Nicholls, E., Ely, A., Birkin, L., Basu, P., & Goulson, D. (2020). The contribution of small-scale food production in urban areas to the sustainable development goals: a review and case study. *Sustainability Science*, 1-15. <http://doi.org/10.1007/s11625-020-00792-z>
- Nozzi, Valentina., Graber, A., Schmautz, Zala., Mathis, A., & Junge, R. (2018). Nutrient Management in Aquaponics: Comparison of Three Approaches for Cultivating Lettuce, Mint, and Mushroom Herb. *Agronomy*, 8, 27. <http://doi.org/10.3390/AGRONOMY8030027>
- Olakunle, M., Sangodoyin et al. (2021). "INNOVATIVE URBAN FARMING TECHNIQUES FOR SUSTAINABILITY OF CITIES: FROM FARM TO FORK – CASE OF THE CITY LANUVIO, ROME, ITALY." *International Journal of Engineering Applied Sciences and Technology*. DOI:10.33564/ijeast.2021.v06i01.005
- Ong, H.G., & Kim, YD. (2017). The role of wild edible plants in household food security among transitioning hunter-gatherers: evidence from the Philippines. *Food Security*, 9, 11-24. <http://doi.org/10.1007/s12571-016-0630-6>
- Parr, D., & Trexler, C. (2011). Students' Experiential Learning and Use of Student Farms in Sustainable Agriculture Education. *Journal of Natural Resources and Life Sciences Education*, 40, 172-180. <http://doi.org/10.4195/JNRLSE.2009.0047U>
- Patilano, J. (2019). Evaluation on the Status of Implementation of Gulayan sa Paaralan Program at Benigna Dimatatac Memorial Elementary School. *Ascendens Asia Journal of Multidisciplinary Research Abstracts*, 3, 2M. <https://ojs.aaresearchindex.com/index.php/AAJMRA/article/view/8006>
- Poda, Ghislain G., Hsu, Chien-Yeh., & Chao, J. (2017). Factors associated with malnutrition among children <5 years old in Burkina Faso: evidence from the Demographic and Health Surveys IV 2010. *International Journal for Quality in Health Care*, 29, 901–908. <http://doi.org/10.1093/intqhc/mzx129>
- Poulsen, Melissa N., Neff, R., & Winch, P. (2017). The multifunctionality of urban farming: perceived benefits for neighbourhood improvement. *Local Environment*, 22, 1411 - 1427. <http://doi.org/10.1080/13549839.2017.1357686>
- Pulighe, G., & Lupia, Flavio. (2020). Food First: COVID-19 Outbreak and Cities Lockdown a Booster for a Wider Vision on Urban Agriculture. *Sustainability*. <http://doi.org/10.3390/su12125012>
- Ramankutty, N., Mehrabi, Z., Waha, K., Jarvis, Larissa., Kremen, C., Herrero, M., & Rieseberg, L. (2018). Trends in Global Agricultural Land Use: Implications for Environmental Health and Food Security. *Annual review of plant biology*, 69, 789-815. <http://doi.org/10.1146/annurev-arplant-042817-040256>
- Rance, A., Asis, N., & Bautista, R. (2019). Gulayan sa Paaralan Program: An Effective Support to the School-Based Feeding Program in San Marcelino Elementary School. *Ascendens Asia Journal of Multidisciplinary Research Abstracts*, 3, 2N.
- Rance, A., Asis, N., and Bautista, R. (2019). Gulayan sa Paaralan Program: An Effective Support to the School-Based Feeding Program in San Marcelino Elementary School, 3, 2N. <https://ojs.aaresearchindex.com/index.php/AAJMRA/article/view/10438>
- Reynolds, K. (2015). Disparity Despite Diversity: Social Injustice in New York City's Urban Agriculture System. *Antipode*, 47, 240-259. <http://doi.org/10.1111/ANTI.12098>
- Richey, R. (2004). Developmental Research: The Definition and Scope. <https://eric.ed.gov/?id=ED373753>
- Roy, Mousumi. (2021). Introduction to sustainable development. *Sustainable Development Strategies*. <http://doi.org/10.1002/0470014202.ch1>
- Saguin, K.K. (2019). Urban Farming and Urban Land Use Dilemmas in Metro Manila: Policy Brief. DOI:10.13140/RG.2.2.28355.12325
- Salah, B., Abidi, M. H., Mian, S. H., Krid, Mohammed, Alkhalefah, H., & Abdo, A.. (2019). Virtual Reality-Based Engineering Education to Enhance Manufacturing Sustainability in Industry 4.0. *Sustainability*. <http://doi.org/10.3390/SU11051477>
- Sanyé-Mengual, E., Anguelovski, I., Oliver-solà, J., Montero, J., & Rieradevall, J. (2016). Resolving differing stakeholder perceptions of urban rooftop farming in Mediterranean cities: promoting food production as a driver for innovative forms of urban agriculture. *Agriculture and Human Values*, 33, 101-120. <http://doi.org/10.1007/S10460-015-9594-Y>

- Sharma, Sachin., Sharma, A., Goel, Tanya., Deoli, Rohan., & Mohan, S. (2020). Smart Home Gardening Management System: A Cloud-Based Internet-of-Things (IoT) Application in VANET. 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 1-5. <http://doi.org/10.1109/ICCCNT49239.2020.9225573>
- Siebrecht, N.. (2020). Sustainable Agriculture and Its Implementation Gap—Overcoming Obstacles to Implementation. Sustainability. <http://doi.org/10.3390/su12093853>
- Silveira, J., Taddei, J. A., Guerra, P. H., & Nobre, M. R. (2011). Effectiveness of school-based nutrition education interventions to prevent and reduce excessive weight gain in children and adolescents: a systematic review. *Jornal de pediatria*, 875, 382-92. <http://doi.org/10.2223/JPED.2123>
- Skar, S., Pineda-Martos, R., Timpe, A., Pölling, B., Bohn, K., Külvik, M., Delgado, C., Pedras, C., Paço, T., Čujić, M., Tzortzakis, N., Chrysargyris, A., Peticila, A., Alenčikienė, G., Monsees, H., & Junge, R. (2019). Urban agriculture is a keystone contribution towards securing sustainable and healthy development for cities in the future. *Blue-Green Systems*. <http://doi.org/10.2166/bgs.2019.931>
- Smith, V. M., Greene, R. B., & Silbernagel, J. (2013). The social and spatial dynamics of community food production: a landscape approach to policy and program development. *Landscape Ecology*, 28, 1415-1426. <http://doi.org/10.1007/s10980-013-9891-z>
- Sung, Kenzo K. (2018). Raciolinguistic ideology of antiblackness: bilingual education, tracking, and the multiracial imaginary in urban schools. *International Journal of Qualitative Studies in Education*, 31, 667 - 683. <http://doi.org/10.1080/09518398.2018.1479047>
- Tanner-Smith, E., Durlak, J., & Marx, Robert A. (2018). Empirically Based Mean Effect Size Distributions for Universal Prevention Programs Targeting School-Aged Youth: A Review of Meta-Analyses. *Prevention Science*, 19, 1091-1101. <http://doi.org/10.1007/s11121-018-0942-1>
- Tekeste, Asayehegn., Wondafrash, M., Azene, G., & Deribe, Kebede. (2012). Cost effectiveness of community-based and inpatient therapeutic feeding programs to treat severe acute malnutrition in Ethiopia. *Cost Effectiveness and Resource Allocation: C/E*, 10, 4 - 4. <http://doi.org/10.1186/1478-7547-10-4>
- The Global Nutrition Report. (2021). The State of Food Security and Nutrition in the World 2021. <http://doi.org/10.4060/cb4474en>
- Touliatos, Dionysios, Dodd, I., & McAinsh, M.. (2016). Vertical farming increases lettuce yield per unit area compared to conventional horizontal hydroponics. *Food and Energy Security*, 5, 184 - 191. <http://doi.org/10.1002/fes3.83>
- Tzioumis, Emma., & Adair, L. (2014). Childhood Dual Burden of Under--- and Overnutrition in Low- and Middle-Income Countries: A Critical Review. *Food and Nutrition Bulletin*, 35, 230 - 243. <http://doi.org/10.1177/156482651403500210>
- Valley, W., Wittman, H., Jordan, N., Ahmed, S., & Galt, R. (2017). An emerging signature pedagogy for sustainable food systems education. *Renewable Agriculture and Food Systems*, 33, 467 - 480. <http://doi.org/10.1017/S1742170517000199>
- Verjans-Janssen, Sacha R. B., Kolk, I. van de., Kann, D. Van., Kremers, S., & Gerards, S. (2018). Effectiveness of school-based physical activity and nutrition interventions with direct parental involvement on children's BMI and energy balance-related behaviors – A systematic review. *PLoS ONE*, 13. <http://doi.org/10.1371/journal.pone.0204560>
- Whittinghill, Leigh J., & Rowe, D. Bradley. (2011). The role of green roof technology in urban agriculture. *Renewable Agriculture and Food Systems*, 27, 314 - 322. <http://doi.org/10.1017/S174217051100038>
- Woolner, P., Clark, Jill, Laing, K., Thomas, Ulrike, & Tiplady, Lucy. (2014). A school tries to change: How leaders and teachers understand changes to space and practices in a UK secondary school. *Improving Schools*, 17, 148 - 162. <http://doi.org/10.1177/1365480214537931>