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AQUAPONICS AS AN ALTERNATIVE TO MEET THE NUTRITION OF TODDLERS IN REALIZING ZERO STUNTING 2024 IN WONOGIRI

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Abstrak

Akuaponik bisa menjadi alternatif inovatif dalam pemenuhan gizi bagi balita yang mengalami stunting. Sistem akuaponik, yang mengintegrasikan budidaya ikan dan pertumbuhan tanaman secara bersamaan, akan menghasilkan hasil pertanian yang kaya nutrisi dan memberikan protein ikan. Kegiatan pengabdian kepada Masyarakat ini bertujuan untuk memenuhi asupan gizi balita terindikasi stunting di Desa Bangsri, Kecamatan Purwantoro, Kabupaten Wonogiri sekaligus mendukung upaya Pemerintah Kabupaten Wonogiri mewujudkan program 2024 Zero Stunting. Metode pengabdian yang dipilih adalah Asset-based Community Development (ABCD) yang terdiri dari kegiatan inkulturasi, discovery, design, define, dan reflection. Data dikumpulkan melalui metode wawancara, observasi dan dokumentasi. Hasil penelitian menunjukkan stunting bukan representasi miskin. Balita stunting juga ada di keluarga mampu. Dari edukasi, fasilitasi, dan pendampingan akuaponik pada keluarga dengan balita stunting selama 30 hari dapat dipanen ikan lele dan sayur kangkung yang sehat dan bebas pestisida sebagai sumber gizi dan protein hewani bagi balita stunting. Hal ini membuktikan bahwa akuaponik memberi perubahan positif dalam pemenuhan gizi balita stunting sekaligus mendukung program 2024 Zero Stunting di Wonogiri.

Kata Kunci: Akuaponik, Balita, Gizi, Stunting

Abstract

Aquaponics can be an innovative alternative in fulfilling nutrition for stunted toddlers. The aquaponics system simultaneously integrates fish farming and plant growth, producing nutrient-rich agricultural products and providing fish protein. This community service activity aims to meet the nutritional intake of toddlers indicated to be stunted in Bangsri Village, Purwantoro District, Wonogiri Regency while supporting the efforts of the Wonogiri Regency Government to realize the 2024 Zero Stunting program. The service method chosen is asset-based community development (ABCD), which consists of inculturation, discovery, design, definition, and reflection activities. Data were collected through interviews, observation, and documentation. The results showed that stunting is not a representation of poverty. Stunted toddlers also exist in well-off families. From the education, facilitation, and assistance of aquaponics in families with stunted toddlers for 30 days, healthy and pesticide-free catfish and water spinach vegetables can be harvested as a source of nutrition and animal protein for stunted toddlers. It proves aquaponics positively affects the nutrition of stunted children and supports the 2024 Zero Stunting program in Wonogiri.

Keywords: Aquaponics, Nutrition, Stunting, Toddler

INTRODUCTION

Stunting refers to children's stunted growth and development caused by chronic malnutrition and recurrent infections. Stunting is characterized by a child's length or height that is below the standard set by the minister in charge of health affairs in the Government (Peraturan Presiden Nomor 72 Tahun 2021). Stunting, a growth problem that occurs in children due to chronic malnutrition, has become a serious concern in the context of global health. Stunted children experience physical and cognitive growth barriers that can impact their health and development in the long term. Stunting usually occurs in early life, especially in the first 1,000 days of a child's life, starting from pregnancy to age two (Hidayat, 2022). This condition can be caused by deficiencies in essential nutrients, chronic infections, and an environment that does not support optimal growth. In overcoming stunting, nutritional fulfillment is crucial because the adequacy of nutrients in that period has a significant impact on shaping the structure of the child's brain and immune system and ensuring optimal body growth (Beal et al., 2018).

The Government has set a target of reducing stunting prevalence in children under five in Indonesia to 14% by 2024. To achieve this target, the Government is currently making efforts to accelerate stunting reduction by encouraging convergence between related programs for families with pregnant women and babies under two years old (TP2AK, 2020)

The Wonogiri Regency Government has set a target to overcome stunting problems in its region by pursuing zero stunting cases by 2024. To realize the "2024 Zero Stunting" program, the local Government is directing health resources and policies focusing on preventing and handling stunting in children (stunting.go.id, 2022). But, according to the latest data in September 2023, the prevalence of children under five who are stunted or potentially stunted has increased to 11.5%, up from 10.6% in August (Praditia, 2023). The still high stunting rate in Wonogiri Regency prompted the local Government to intensify mitigation efforts. The Wonogiri Regency Government must take strategic steps to fulfill nutrition public health education and increase accessibility to children's health services. The urgency of fulfilling nutrition to overcome stunting includes positive impacts on children's health and development.

The availability of adequate nutrients, especially protein, iron, vitamins, and other minerals, is key in accelerating a child's physical and cognitive growth.

More proactive stunting prevention programs, including nutrition education for pregnant women and toddlers and health counseling campaigns in the community, are key to reducing stunting prevalence. Several previous studies have been conducted to support the hypothesis. Providing good nutrition from an early age can prevent children from the risk of stunting and long-term health problems (Hamer et al., 2022). After receiving lectures on the knowledge of childcare and balanced feeding at 1000 HPK and the importance of exclusive breastfeeding and breastfeeding pregnant women and mothers under five, they increased their understanding and knowledge of the importance of fulfilling nutrition to prevent stunting (Sinaga et al., 2022). The nutritional status of the three selected toddlers monitored for 33 days improved, as evidenced by increased weight and height. This program has successfully raised mothers' awareness of the importance of nutrition and healthy food innovation. This study emphasizes the importance of education and intervention in overcoming stunting (Septiana et al., 2023).

Ten stunted toddlers will be in August 2023 in Bangsri Village, Purwantoro District, Wonogiri Regency. Collaboration with the private sector, health institutions, and community organizations is also important to achieve optimal results (Martony, 2023). This service was carried out slightly differently but in line with previous service research. Service-based Asset-Based Community Development (ABCD) aims to maximize limited yard land for families with stunting toddlers in Bangsri Village, Purwantoro, and Wonogiri. The collaboration between the Village Government, students, and lecturers implementing the 2023 Community Service Activities (KPM) educates and facilitates aquaponics, which is a combination of catfish and water spinach cultivation in water planting media as a fulfillment of stunting toddler nutrition while supporting the 2024 Zero Stunting program launched by the Wonogiri Regency Government. With serious commitment and efforts, the Wonogiri Regency Government can accelerate the reduction of stunting rates and improve children's welfare.

METHOD

Community service activities were held in Bangsri Village, Purwantoro District, Wonogiri Regency. Community service implementation will occur from July 3, 2023, to August 9, 2023. The participants of this activity were families of 10 children with malnourished status from four different hamlets. The method used is the Asset Based Community Development (ABCD) approach. ABCD is a community development approach that emphasizes harnessing their internal potential. Regional welfare depends not only on outside assistance but also on the ability of the community to optimize its assets. ABCD encourages community empowerment and awareness that solutions should come from local resources (Al-Kautsari, 2019).

The implementation of ABCD method service activities consists of five stages: inculturation, Deep understanding of the culture, values, and potential of the local community. Discovery Identify empowerable local potentials, such as skills and natural resources. Design, plan, and create a program or project based on identified local potential. Define common goal setting and role sharing between teams and communities. Reflection, evaluation of outcomes, impact, and shared reflection for further learning and development (LPPM IAIN Ponorogo, 2023).

ANALYSIS AND DISCUSSION

The stages of service activities with the ABCD approach in Bangsri Village, Purwantoro District, Wonogiri Regency, have a dual purpose: to meet the nutritional intake of toddlers indicated to be stunting and support the Wonogiri Regency Government's efforts towards the 2024 Zero Stunting program. Here are the series of activities carried out:

1. Inculturation

This research began with the inculturation stage, which involved in-depth interaction between researchers and the people of Bangsri Village. The main focus of this stage is to thoroughly understand the social environment and daily life of people who have stunting cases. Researchers are actively involved in intensive dialogue with families with stunted toddlers. In this process, they listen to daily stories reflecting everyday life's reality, from health issues to eating habits.

Through the inculturation stage, researchers see the potential and problems of stunting cases and feel the local nuances that shape the social context in Bangsri Village. Introduction to cultural values, traditions, and interaction dynamics between citizens allows researchers to place stunting cases in a broader context. By actively interacting, researchers can explore the risk factors and opportunities that influence nutritional intake and toddler growth at the community level.

The inculturation stage becomes a critical foundation for researchers to design responsive and responsive approaches in accordance with the community's needs. With an in-depth understanding of the local potential and the problems faced, researchers can detail the factors that can support or hinder the improvement of stunting conditions. This stage is an important first step in research efforts to formulate relevant and sustainable solutions to overcome the problem of stunting in Bangsri Village.

2. Discovery

After inclusion and interaction with local stakeholders in Bangsri Village, the discovery stage led researchers to critical data discovery. Involving collaboration with village governments, midwives, community leaders, and residents, the research team provided counseling on the dangers of stunting for toddler growth. The material is delivered through power points with clear images, followed by question-and-answer evaluations and interactive discussions. The implementation team ensured the participants' understanding, and the evaluation questions were answered well. In its implementation, the team tried to maximize time in the field to facilitate understanding of the material. Researchers identified ten toddlers as being stunted spread across four hamlets, namely Wates Wetan, Wates Kulon, Jetak, and Bangsri.

The discovery of stunting data on toddlers from four different hamlets opened up insights into the characteristics and patterns that might contribute to the problem. By compiling data per hamlet, the research team was able to map the distribution of stunting cases, identify local people's food patterns, and detail environmental factors that may play a role in child nutrition problems. These findings form the basis of information needed to develop strategies and interventions that are more targeted and effective in tackling stunting in Bangsri Village. This discovery phase details the problem of stunting and opens up opportunities to involve the community in further research. By knowing the spread of stunting, the research team can build awareness

and community involvement, more specifically, ensuring that the proposed solutions truly reflect local needs and realities. This discovery became the foundation for designing sustainable prevention and intervention programs according to the unique conditions and community dynamics in the four hamlets of Bangsri Village.

Table 1. Data on Stunting Toddlers in Bangsri, Purwantoro, Wonogiri in July 2023

No	Child Name	Parents' Name	Address		
			Hamlets	RT	RW
1.	Devina	Supriyanto	Wates Wetan	2	5
2.	Fitri Citra N.	Santoso	Wates Kulon	3	4
3.	Ahmad Faizun	Giyono	Jetak	3	1
4.	Efendi Attar D.	Santoso	Wates Wetan	2	5
5.	Sania	Harsono	Wates Wetan	2	5
6.	Septiana	Teguh	Bangsri	5	2
7.	Gavin Artyr Alfarizi	Yanuar Ari	Bangsri	5	2
8.	Syakila Rizki Ramadhani	Susanto	Bangsri	4	2
9.	Syafira Rizki Ramadhani	Susanto	Bangsri	4	2
10.	Naura Azkiya Zhafira	Anto	Jetak	4	1

Source: Posyandu Balita Data, July 11, 2023

In the in-depth discovery stage, the team explored local potentials that can become a strong foundation for developing community empowerment programs. Their main finding is that the people of Bangsri Village have very potential land for catfish and water spinach aquaponics cultivation. The land in Bangsri Village is a valuable resource and can become a foundation for sustainable agricultural innovation.

In addition to the potential of the land, the research team also found prominent interests and skills related to sustainable agricultural practices in the community. Some residents of Bangsri Village showed a strong interest in developing environmentally friendly agricultural methods. Specific skills in agriculture were also found, providing a solid basis for actively involving communities in implementing catfish and water spinach aquaponics programs.

These findings identify physical potential and reflect the underlying social support and interest in creating positive change. By discovering this potential and interest, the service team builds a solid foundation to design empowerment programs that align with local realities and motivate communities to be actively involved in implementing sustainable agriculture programs.

3. Design

After the discovery stage, which resulted in a deep understanding of the local potential in Bangsri Village, the service team moved on to the next stage, namely the design of a catfish and water spinach aquaponics implementation program. In this design, close collaboration with the community is a key point to ensure the sustainability and success of the program. The team is directly involved in planning the aquaponics system, ensuring that the design is effective, appropriate to local conditions, and can be applied by the community in a sustainable manner.

The program design not only covers technical aspects but also emphasizes participatory approaches. The team and the community developed a technical training plan covering various aspects, from aquaponics management to catfish and water spinach care. The training is designed to provide knowledge and practical skills to the community, enabling them to become key actors in implementing the program.

In addition, the program design includes the distribution of equipment needed to begin aquaponics cultivation. This equipment is adapted to the scale of the household and strives to be easily accessible to every family involved. The equipment distribution is a strategic step to ensure that people can apply the knowledge gained from training in real-time in their daily activities.

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		Kapas		

Figure 1. Aquaponics Tools and Materials

After the tools and materials needed have all been prepared, there are several steps to note, namely:

a) The first step in making aquaponics is to punch a hole in the bucket lid using a used milk can filled with hot charcoal and place a plastic cup filled with water spinach plants.

Figure 2. The process of punching the bucket lid, punching the bucket can be from 5-8 holes

b) The next step is to punch a hole in a plastic cup using a knife or scissors, and this hole will be used for cotton media to absorb water for the growth of water spinach plants in the future.

Figure 3. The process of perforating plastic cups

c) After the process of punching the lid of the bucket and plastic cup, the next process is to put the water spinach seed into the glass that has been punched, then insert cotton in the hole of the plastic cup and cover the root with charcoal as much as 50-80% of the size of the glass.

Figure 4. The process of placing water spinach seedlings on plastic cup media

d) Then, fill the bucket with water as much as ± 48 liters and put 10-30 catfish seeds. After that, put a plastic cup containing water spinach seeds on the lid of the bucket that has been hollowed out, positioning the bottom of the glass on the surface of the water.

Figure 5. Placement of water spinach plants and catfish seedlings

4. Define

The defined stage involves a joint commitment between the service team and the participant's family. Researchers distributed ten aquaponics packets to 10 families

with stunted toddlers. The team also taught each parent and family their purpose, role, benefits, and how to maintain catfish and water spinach aquaponics to meet toddler nutrition requirements. This interaction creates a sense of ownership and shared responsibility for the program's sustainability. The community is encouraged to work together in growing and caring for catfish and water spinach. This collaborative approach creates closer social bonds between citizens. Thus, this program's design reflects the service team's commitment to not only providing practical solutions but also building community capacity and independence in aquaponics management.

This distribution activity will be carried out on July 27, 2023; in this distribution, students are divided into several groups for time efficiency. This aquaponics distribution is also accompanied by village officials, more precisely, accompanied by every hamlet head in Bangsri Village. Students also provide education on maintenance so that buckets are placed in places exposed to sunlight but not too hot, especially for the photosynthesis needs of water spinach plants. Fish feeding 1-2 times a day.

Figure 6. The Village Chief accompanied aquaponics distribution to stunted toddlers

5. Reflection

After implementation, the team and the community reflect together to evaluate the successes and challenges. They discussed the positive impact on the condition of stunted toddlers and aspects that can be improved. These reflections became the basis for further development and improvement of the program in the future. This community service activity is continued with monitoring or supervision of fish farming in buckets or aquaponics given to parents of stunted children. Parents of stunted children seem enthusiastic about the delivery of this simple aquaponics, as seen from some of the questions asked. Some of the questions asked are about how to provide nutrients to plants, how to meet water needs in one container, and how to care for them.

Several obstacles occur, such as plants that experience etiolation (plant height growth without increasing the number of leaves), which are in catfish cultivation buckets due to lack of sunlight. Thus, the plant is transferred to the sun. However, farmed fish grow well because people feed using appropriate fish feed daily. Due to time constraints, monitoring activities are not carried out until vegetables and fish are harvested.

The next stage of this devotion is to monitor the growth of toddlers and vegetables raised in buckets. Aquaponics (fish farming in buckets) has been running for approximately three weeks since distribution by KPM students, and some can be harvested. Then, in Bangsri Village, before there was aquaponics from students, the Village had programmed additional feeding for stunted children. So, for the growth of toddlers to increase, there is no decrease in weight. This shows that catfish and vegetable protein consumption can meet toddler nutrition requirements, which impacts weight gain.

CONCLUSION

Through community service that integrates the aquaponics system in Bangsri Village, Purwantoro District, and Wonogiri Regency, this program can provide concrete solutions to overcoming the problem of stunting in toddlers. By showing that stunting toddlers are not limited to low-income families, this activity shows the relevance of aquaponics as an innovative alternative to fulfilling nutrition. With positive results in fulfilling nutrition through catfish and water spinach vegetables produced, aquaponics provides hope to address the root causes of stunting at the local level, support the Wonogiri Regency Government's Zero Stunting 2024 vision, and prove that the application of aquaponics methods can be a progressive step in combating stunting in Indonesia.

The advantages of this research include its relevance to public health issues, the application of the community-based ABCD method, positive impacts in a relatively short time, and its consistency with the 2024 Zero Stunting program. However, the weaknesses of the study involved a relatively small and locally representative scale, limited mentoring time for long-term evaluation, reliance on active community involvement, and the potential influence of external factors that were not fully

controlled. Nonetheless, this study provides an important foundation for developing stunting prevention programs at the local level.

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