

Training on Making Hand Sanitizers Made from Local Plants to Prevent the Spread of Covid-19 (Case Study in Kambu District Kendari City)

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ABSTRACT

This activity is expected to be a solution to prevent the spread of Corona Virus Disease (Covid-19), which is becoming a global pandemic. This effort is expected to provide additional knowledge to the community about how to make, function, and component, the practice of making and using hand sanitizers made from natural non-alcoholic, and non-toxic ingredients from local plants that are easy to obtain. This activity was carried out in September 2022. Counseling begins with the presentation of material through interactive presentations and discussions with the target subject. Then the counseling continued with the practice of making and using hand sanitizers made from local plants: lime, mint leaves, and aloe vera gel. The activity's success can be said to be successful because it is seen from the participation of the target audience, namely 75% of the targeted minimum of 60%, and the implementation of all community service procedures thoroughly and adequately by the implementing committee of community service activities.

Keywords: Covid-19, Mint leaves, Hand Sanitizers, Lime, Aloe vera

ABSTRAK

Kegiatan ini diharapkan menjadi solusi untuk mencegah penyebaran *Corona Virus Disiase* (Covid-19) yang sedang menjadi pandemi global. Upaya ini diharapkan dapat memberikan pengetahuan tambahan kepada pihak masyarakat tentang cara pembuatan, fungsi dan komposisi, praktik pembuatan dan penggunaan *hand sanitizer* berbahan dasar alami non alkohol dan non toksik dari bahan-bahan tumbuhan lokal yang mudah diperoleh. Pelaksanaan kegiatan ini dilakukan pada bulan September 2022. Penyuluhan diawali dengan pemaparan materi melalui presentasi dan diskusi interaktif dengan subjek target. Kemudian penyuluhan dilanjutkan dengan praktik pembuatan dan penggunaan *hand sanitizer* berbahan dasar tumbuhan lokal, yakni : jeruk nipis, daun mint serta gel lidah buaya. Keberhasilan kegiatan dapat dikatakan sukses karena dilihat dari keikutsertaan khalayak sasaran yakni 75% dari yang ditargetkan minimal 60%, dan terlaksanakannya semua prosedur pengabdian masyarakat secara baik dan menyeluruh oleh panitia pelaksana kegiatan pengabdian masyarakat.

Kata Kunci : Covid-19, Daun mint, *Hand Sanitizer*, Jeruk nipis, Lidah buaya

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INTRODUCTION

At the end of 2019, the world was shocked by a new disease outbreak in the Wuhan area of China. Not long after, the plague then spread to all corners of the world. On March 11, 2020, the World Health Organisation (WHO) declared the outbreak a pandemic. The latest figures reported by the World Health Organization (WHO) state that 212 countries in the world have been affected, with around 1,356,780 positive cases and 79,385 deaths recorded due to this outbreak (Adiukwu *et al.*, 2022)

The outbreak is caused by a new variant of the influenza virus known as the coronavirus, with the official name for the disease being Covid-19 (Susilo *et al.*, 2020). This type of virus variant is relatively new. It spreads quickly, with the most frequent transmission medium from the patient's body fluids, especially droplets from the patient's respiratory tract. However, some health practitioners are beginning to be aware of the pattern of spreading this disease through the air medium (airborne) (Susilo *et al.*, 2020).

Coronavirus is an RNA virus with a particle size of 120 nm-160 nm. The virus infects animals, including bats and camels. Coronavirus which is the etiology of Covid-19, belongs to the genus betacoronavirus. The spread or transmission of SARS-CoV-2 from human to human is the primary source, so its spread becomes more aggressive (Susilo *et al.*, 2020). Based on biopsy results on the gaster, duodenal and rectal epithelial cells of SARS-CoV-2 were shown to infect the GI tract. This virus can be detected in the feces, and it is reported that 23% of patients reported that the virus remains detected in the feces even though it is not detected in the airway sample. SARS-CoV-2 infects cells in the airway lining the alveoli in humans (Adiukwu *et al.*, 2022; Susilo *et al.*, 2020).

Amid the Covid-19 pandemic currently afflicting the world, everyone must make the need for clean and healthy lifestyle behavior. Awareness of handwashing to maintain health has been implemented in Indonesia since Covid-19 entered Indonesia (Thalib, 2020). Washing hands using soap and water is the most effective way to clean dirt on the skin's surface from various microorganisms and viruses, but sometimes washing hands is troublesome because not all corners of the room have water and soap. Antiseptics are chemicals that prevent the multiplication of microorganisms on the body's surface by killing these microorganisms or inhibiting their growth and metabolic activity (Desiyanto & Djannah, 2013). Along with the increasing busyness of the community, it has triggered the emergence of innovative instant hand sanitizer products that can be used anywhere without water, known as antiseptic hand sanitizers or hand sanitizers (Jing *et al.*, 2020; Thalib, 2020). Hand sanitizer is an antiseptic substance with a percentage of alcohol of 60-95%. According to the Food and Drug Administration (FDA), alcohol in hand sanitizer can have good bactericide activity against positive gram bacteria and gram-negative bacteria so that it can remove germs in less than 30 seconds (Asngad Aminah *et al.*, 2018; Cahyani, 2014).

Based on research on the effectiveness of hand sanitizers in eliminating germs, this antiseptic has a positive effect on reducing the number of germs. In the treatment without hand sanitizer, the number of germs is still high, while in the hand sanitizer treatment, the number of germs is much lower (Cahyani, 2014). According to Cordita *et al.* (2019), soap can kill germs with an effectiveness rate of 73%. However, it is not possible to wash hands using water and soap. In that case, it can be substituted with hand sanitizer because this antiseptic substance can reduce the number of germs by 17.29 CFU / cm² with an effectiveness of 60%. Meanwhile, according to Darmayani *et al.* (2017), hand sanitizers show more effective results in reducing bacteria than liquid soap, namely hand sanitizers by 96% and liquid soap by 95%.

Hand sanitizers generally contain 62% Ethyl Alcohol, softeners, and moisturizers. In addition to alcohol and softeners, hand sanitizers contain other antibacterial agents such as triclosan, glycerol, tannins, saponins, and other antimicrobial agents. The active ingredient contained in hand sanitizers is alcohol which has the highest effectiveness against viruses, bacteria, and fungi and also does not cause resistance to bacteria. Alcohol itself can make hands dry, so hand sanitizers should be equipped with moisturizers and emollients, which keep hands soft and do not become dry, unlike pure alcohol solutions that can cause dehydration of the skin. Hand sanitizer will generally evaporate so that it does not leave residue or make hands sticky (Aiello *et al.*, 2010; Larson *et al.*, 2005).

Alcohol-based hand sanitizers cannot replace handwashing with soap and running water. Previous research concluded that the use of hand sanitizers from chemicals turned out to have a considerable impact on health (Adeyani *et al.*, 2020). In addition to flammability, alcohol-based hand

sanitizers can also increase the risk of viral infections that trigger inflammation of the gastrointestinal tract. Some hand sanitizer gel preparations are widely available in the market and contain a lot of alcohol and other antibacterials. In addition, not all societies have good skin resistance to alcohol. Phenol compounds are the most commonly used composition because these compounds are not only found in synthetic antibiotics and natural compounds known as polyphenols (Ghosh *et al.*, 2019). The innovation of making hand sanitizers made from non-alcoholic materials can be an alternative for people who have a high sensitivity to alcohol content.

Therefore, it is necessary to look for antiseptics from natural ingredients that are relatively cheaper, safer, effective, and easy to get, including lime, mint leaves, and aloe vera. These various plants are known to contain various active substances that have the potential to inhibit the growth of bacteria and viruses, namely saponins, flavonoids, and essential oils, and have a distinctive and sharp odor. Therefore, this local plant can be formulated into hand sanitizer preparations and natural-based disinfectants (Jing *et al.*, 2020).

Many plants can be used as natural ingredients for hand sanitizers, one of which is lime. Lime (*Citrus aurantifolia* S.) is one of the plants easily obtained in the community and is widely used as a traditional herb or mixture as a flavor or aroma (Lauma *et al.*, 2015; Razak *et al.*, 2013). In addition to being used as an aroma, lime also contains elements of helpful chemical compounds, such as essential oils that have an antibacterial function. These flavonoids can inhibit the growth of *Staphylococcus aureus* (germs on the skin) and also have a distinctive aroma (Lauma *et al.*, 2015). The study Lauma *et al.* (2015) stated that lime juice squeeze has an antibacterial effect in inhibiting the growth of *Staphylococcus aureus* bacteria; this is shown by the formation of an inhibitory zone of lime juice squeeze against *Staphylococcus aureus* by 14.22 mm. Its antibacterial function will help in maintaining hand hygiene. The confluence of acids from lime and salt will create a reaction that increases hydrogen-free ions (Hardoko *et al.*, 2022).

Mint leaves (*Mentha piperita* L.) are widely used in the pharmaceutical, cigarette, and food industries, among others, to manufacture toothpaste, wind oil, balsam, confectionery, and others. Based on its use as a seasoning, mint (*Mentha piperita* L.) can be used to season meat, fish, sauces, soups, boiled dishes, vinegar, tea drinks, tobacco, and wine. New leaf tips of all types of mint are also used in drinking, fruit, applesauce, ice cream, jelly, salads, and vegetables. Meanwhile, in medicine, the volatile mint leaf oil extract content of menthol is used for stomach pain, cough relief, inhalation, mouthwashes, toothpaste, etc. Mint leaves (*Mentha piperita* L.) are used by herbalists as an antiseptic, antipruritic, and carminative remedy (Soa *et al.*, 2018).

Aloe vera (L.) Webb.) has many benefits, such as producing raw materials for various food, pharmaceutical, and cosmetic industry products. Aloe vera contains saponins that can clean and are antiseptic (Gusviputri *et al.*, 2013; Mohite *et al.*, 2021). In addition, aloe vera also contains accemanant, which functions as an antiviral, antibacterial, and anti-fungal. Accemanan can also eliminate tumor cells and increase the body's resistance. By using aloe vera as an ingredient in making hand sanitizers, it is not only able to kill bacteria but also can soften the skin. This is due to the presence of lignin which is useful for maintaining skin moisture and retaining water in the skin so that excessive evaporation does not occur (Mohite *et al.*, 2021).

Making hand sanitizers in the form of hygienic liquid preparations from plant (natural) materials is not complex and does not require expensive costs. The materials and equipment needed are very simple to produce and have economic value, in addition to the plants needed for making hand sanitizers. At the same time, it can also be used as a disinfectant made from local plants cultivated in the yard at home (Thalib, 2020).

Seeing the considerable benefits of a mixture of lime juice, mint leaf extract, and aloe vera in making hand sanitizer to respond to the Covid-19 pandemic situation, it is necessary to convey this good knowledge to the people of the Kambu district, which can be carried out through Community Service activities. This activity includes making hand sanitizers by providing knowledge and how to make non-alcoholic and non-toxic natural-based hand sanitizers from local plant ingredients to the community in Kambu District. It is expected to improve the degree of public health independently and increase the economic income of citizens.

METHOD

1. Time and place of execution

This activity was carried out in September 2022 in Kambu District, which consists of 4 villages, namely: Kambu Village, Lalolara Village, Mokoau Village & Kelurahan Padaleu.

2. Means of Activity

Instruments used: Booklets, leaflets, container bottles, banners, and LCDs.

Tools and Materials

Tool: Pot, Bowl, Knife, Scissors, Stove, Sieve, Cutting Board, Analytical Scales

Ingredients: Lime Squeeze: 8 mL, Mint Leaves: 50 grams, Aquadest: 200 mL, and Aloe Vera Gel: 5 tbsp.

- Mint Leaf Extraction

The manufacture of mint leaf extract is carried out by extracting the infusion method followed by evaporation. Infusion is the extraction with a water solvent at the temperature of the water bath (the infusion vessel is immersed in a boiling water bath), the measured temperature (96- 98 °C) for a specific time (15-20 minutes) (Ministry of Health of the Republic of Indonesia, 2006).

- Extraction Method :

Thoroughly washed mint leaves are dried and then cut into pieces. A total of 50 grams of mint leaves are put in a container plus 200 ml of aquadest, then crushed/simmered on a saucepan that has been given water for 15 minutes at a temperature of 98°C. After that, the container is lifted and allowed to stand for 30 minutes. After cooling, the extract is filtered until a clear filtrate is obtained.

Making Hand sanitizer

The filtrate of mint leaf extract, coupled with other ingredients, for manufacturing 100ml of hand sanitizer, obtained a ratio of 40 ml of mint leaf extract: 8 ml of filtered lime juice: aloe vera gel 5 tbsp. All ingredients are mixed evenly, then filtered and put into bottles.

Furthermore, the results of the Organoleptic examination of the hand sanitizer are recorded. The following is an example of recording organoleptic results in Table 1. Organoleptic Results

Table 1. Organoleptic Results

Examination	Results
Shape	Liquid
Color	brownish green
Smell	Menthol

3. Activity Implementation Procedure

The form of implementation of this activity is divided into 2, namely:

- Counseling on Corona Virus disease (Covid-19), a global pandemic, especially for the community in Kambu District, is coupled with education related to natural-based hand sanitizers from local plant ingredients that are easy to obtain. Counseling begins with the presentation of material through presentations and interactive discussions with the target subject.
- The counseling continued with the practice of making and using hand sanitizers made from local plants: lime, mint leaves (*Mentha piperita* L.), and aloe vera gel, whose manufacturing procedures have been explained in detail in the booklet.

RESULTS AND DISCUSSION

This community service activity aims to increase public understanding/knowledge about how to make hand sanitizers. This activity is also expected to improve skills through training in making hand sanitizers with simple methods and relatively affordable costs.

Hand sanitizer is a health product that can instantly inhibit and kill germs without water and can be used anytime and anywhere. This preparation is popularly used because it is easy and does not require water and soap. People usually use this product when their hands are used before eating, after leaving the toilet, and after taking out the garbage. Various bacteria easily stick to human hands, such as staphylococcus aureus, E.colli, salmonella, and shigella. Foodstuffs prepared by direct hand contact without a handwashing process can potentially be contaminated with these bacteria. This activity was

held on September 10, 2022. It was attended by sub-district heads, village heads, and communities in the Kambu District area from 4 villages, namely Kambu Village with 15 people, Lalolara Village with 15 people, Mokoau Village with 15 people, and Padaleu Village with 15 people, and was also attended by younger students from Halu Oleo University and fellow local journalists from Kendari. The attendees reached 80% of the planned target, namely 80 people in the targeted community, and around 60 people attended this community activity. At the time of the implementation of the Pengabmas activity, which was held for 1 day at the Kambu Sub-district office, there were also no obstacles found in the implementation process. The participant's response to this training seemed very enthusiastic, considering that hand sanitizers were often used in participants' daily lives either at home or as friends while on the go. This training can provide solutions for making preparations for personal health at very affordable prices and materials that are easy to get and have a high economic value because, after processing, these materials can produce a product that has a reasonably high selling value.

This training began with counseling on the benefits and content of hand sanitizers made from local plants, namely lime, mint leaves, and *aloe vera*, presented in figure 1. This is so that participants can find out how many benefits of using hand sanitizers whose ingredients can be obtained around us and can even be found in everyday life. The discussion about the benefits of hand sanitizers lasted quite a long time because people's curiosity was relatively high, including alternatives to using other plants that might also be used as essential ingredients for hand sanitizers. The next stage is the manufacture of hand sanitizer products.



Figure 1. Submission of Materials

The ideal hand sanitizer should have several things, such as having microbial destroying properties and actively fighting the vegetative phase of bacteria, mold, and yeast. In addition, hand sanitizers must also survive or be active even in an environment containing organic matter such as detergents, soap residues, water hardness, and differences in pH. To meet these standards, several previous studies have shown that hand sanitizers that can clean well are characterized by tests for microbes, are stable, easy to use, and non-toxic.

Non-Alcoholic Hand Sanitizer is an alternative for people who have sensitivity to alcohol content with a high concentration and are safer to use for young children. This is because if used excessively and continuously, it can be dangerous and cause irritation to cause burning on the skin (Asngad Aminah *et al.*, 2018). In addition, it is also known that alcohol is a flammable chemical compound, and alcohol-based hand sanitizers can also increase the risk of viral infections that trigger inflammation of the gastrointestinal tract (Cahyani, 2014). The mechanism of action of Hand Sanitizer in killing germs and bacteria is illustrated in Figure 2.

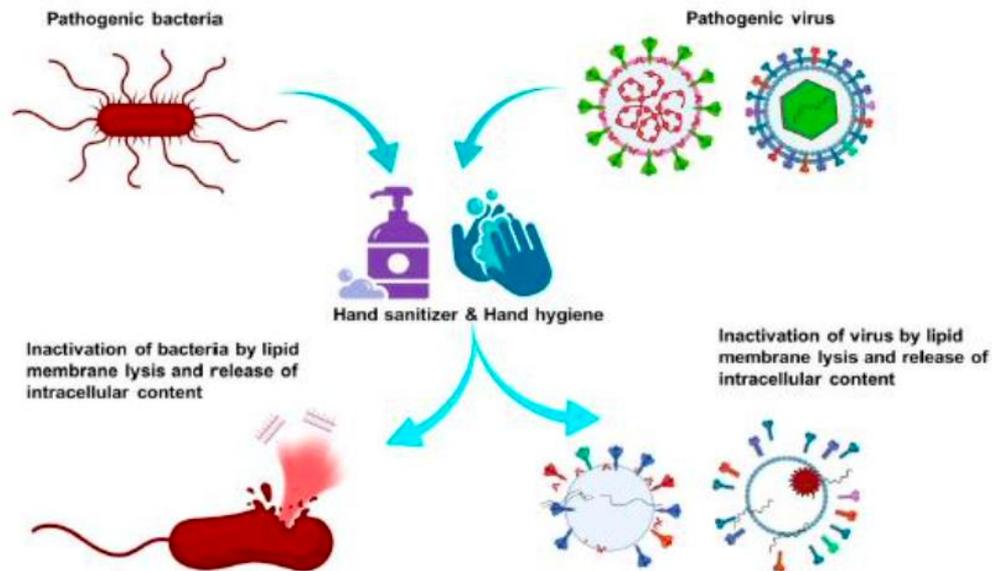


Figure 2. The mechanism of action of Hand Sanitizer in killing germs and bacteria
(Source: Jing *et al.* (2020))

In this adder, the manufacture of non-alcoholic hand sanitizers is made from mint leaf extract (*Mentha piperita* L.), aloe vera gel (*Aloe vera* (L.) Webb.) and lime juice (*Citrus aurantifolia* swingle). Where ekstrak mint leaves are obtained by extraction using water solvents (information extraction), mint leaves are put into a vessel with water and then heated using boiling water vapor (98 °C) for 20 minutes because it is expected that at that temperature, soursop leaf cells will degrade faster so that the extraction of antiseptic compound components is faster. According to Mandal & Hemalatha (2007), the heating process can cause leaf cells to degrade. This is supported by *Aiello et al.* (2010), theory that the longer the heating process at boiling water temperature (90-98 °C), the more substances can be extracted. The process of boiling mint leaves in a closed container minimizes the release of water vapor from mint leaf juice (Soa *et al.*, 2018).

Hand sanitizer preparations are made according to the formula design. The manufacture of 100 mL hand sanitizer obtained a ratio of 40 mL of mint leaf extract: 8 mL of filtered lime juice: and 5 tbsp aloe vera gel, where each ingredient has its content and benefits.

Lime juice contains elements of beneficial chemical compounds, e.g., limonene, linalin acetate, phellandrene, and citrine. Lime juice is used in the cosmetic industry as an ingredient to reduce facial pores, cleanse and refresh. Several studies that have been carried out have proven that the content of essential oils in lime juice can inhibit the growth of *Staphylococcus aureus* bacteria, *Streptococcus mutans*, and *Salmonella typhosa* (Elon & Polancos, 2015; Hardoko *et al.*, 2022; Lauma *et al.*, 2015; Pratiwi *et al.*, 2017; Razak *et al.*, 2013).

Mint leaves (*Mentha piperita* L.) are widely used in the pharmaceutical, cigarette, and food industries, among others, to manufacture toothpaste, wind oil, balsam, confectionery, and others (Soa *et al.*, 2018). While in medicine, the volatile mint leaf oil extract content of menthol is used for stomach pain, cough relief, inhalation, mouthwashes, toothpaste, etc. Mint leaves (*Mentha piperita* L.) are used by herbalists as an antiseptic, antipruritic, and carminative remedy. Menthol (C₁₀H₂₀O) is the main content of mint leaf essential oil (*Mentha piperita* L.), which is thought to play an important role in inhibiting the growth of *Staphylococcus aureus* bacteria (Cahyani, 2014; Razak *et al.*, 2013). In addition to menthol, mint leaf essential oil contains terpenoid compounds and monoterpenes. In inhibiting the growth of *Staphylococcus aureus* bacteria, the content of active compounds in mint leaf extract has a different mechanism. Terpenoid compounds have a mechanism of action that involves the destruction of membranes by lipolytic compounds. Terpenoids will react with transmembrane proteins (porin) on the outer membrane of the bacterial cell wall forming strong polymer bonds and damaging porin so that bacterial cells will lack nutrients and cause bacterial growth to be stunted or die (Haryati *et al.*, 2015). In Singh *et al.* (2015) related to the inhibitory power test of mint leaf extract

(*Mentha piperita*) against *Staphylococcus aureus* bacteria, it was concluded that a mint leaf extract (*Mentha piperita*) concentration of 100% is an effective concentration in inhibiting the growth of *Staphylococcus aureus* bacteria with an inhibitory zone of 16.375 mm.

Another composition is in the form of active ingredients of aloe vera plants that have been identified as saponins, sterols, acemannan, and anthraquinones. Research by Ariyanti *et al.* (2012), states that aloe vera extract can inhibit the growth of *Pseudomonas aeruginosa* in vitro. In addition, aloe vera can inhibit the growth of *Escherichia coli*. In a study conducted by Gusviputri *et al.* (2013) to determine the ability of aloe vera as an antibacterial, a bacterial test was carried out between hands that were not smeared with aloe vera and hands smeared with aloe vera. The bacterial test is carried out by sterilizing the cotton bud to be used by passing it over the bunsen fire. Bacteria are taken on the hands by applying cotton buds on the palms, backs of the hands, and between the fingers. Unscrewed petri dish cover and cotton bud are applied to the surface in order with a zigzag pattern. Then put in a saucer planted with bacteria in an incubator and calculated the number of bacteria at 24 and 48 hours. The result was that the number of bacteria on the hands decreased after smearing aloe vera. This proves that aloe vera has antiseptic abilities, so aloe vera can be used as one of the essential ingredients for making natural hand sanitizers.

After the series of product manufacturing is completed, participants can immediately feel the products that have been made so that this training is felt the benefits. At the time of the implementation, the community seemed very enthusiastic and immediately tried to make hand sanitizers with the materials and tools provided, the packaging of the activity results is as shown in figure 3. In addition, products that the community has made can be packaged in simple form and used at home and on the road. This is by the expected output, namely in the form of products that can be made reasonably cheaply.



Figure 3. Sample Results of Community Service Activities Homemade Hand Sanitizer Products are non-alcoholic and non-toxic

Hand sanitizer products from natural ingredients use various ingredients from plants that are easy to get around the residential environment, have a distinctive aroma, and have been proven to kill germs. How to make hand sanitizer preparations using cheap and simple tools according to what is cooled and favored by the public, especially the lower middle class. They are directly guiding the community in making hand sanitizer preparations until results are obtained from hygienic hand sanitizer preparations that have antiviral properties with a fresh aroma. Hand sanitizers are very useful for maintaining cleanliness and health during the Covid-19 pandemic. Hopefully, we can be further researched hand sanitizers from local plants that have medicinal properties so that the wider community can apply them because the country of Indonesia is an area rich in medicinal plants.

CONCLUSIONS

The target of this community service activity is 80 people in the Kambu sub-district area spread across 4 villages, namely: Kambu Village (20 people), Lalolara Village (20 people), Mokoau Village (20 people) & Kelurahan Padaleu (20 people). The activity is successful when viewed from the participation of the target audience of at least 60% of the targeted and the implementation of all community service procedures properly and thoroughly by the organizing committee for community service activities, where it is known that the total number of people of Kambu District who participated in this activity amounted to 60 people, which means that they have met the total target audience, which is at least 60% of the targeted, namely: Kambu Village (15 people), Lalolara Village (15 people), Mokoau Village (15 people) & Padaleu Village (15 people).

At the time of the implementation of the Pengabmas activity, which was held for 1 day at the Kambu Sub-district office, there were also no obstacles found in the implementation process. The participant's response to this training seemed very enthusiastic, considering that hand sanitizers were often used in participants' daily lives either at home or as friends while on the go.

This training can provide solutions for making preparations for personal health at very affordable prices and materials that are easy to get and have a high economic value because, after processing, these materials can produce a product that has a reasonably high selling value.

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