

## Harnessing Infographic Media to Improve Knowledge of Hypertension Management During Pregnancy

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### ABSTRACT

Hypertension during pregnancy is a cause of morbidity and mortality in mothers and children worldwide. One of the other factors is that the level of knowledge of hypertensive pregnant women is not optimal due to the lack of information about controlling hypertension. Efforts made to improve the knowledge of pregnant women about hypertension in pregnancy are with various media health education. This research uses the literature review method by searching for sources through the Electronic Data Base. The electronic database used is google scholar which begins with determining topics and keywords for searching articles and journals. Search through PubMed, Google Scholar, and Web of Sciences, Sciences Direct. The research process includes a critical review and assessment of existing literature sources. As well as determining the topic and keywords 'hypertension, pregnant women, infographic media, and knowledge' for searching articles and journals in accordance with what the researcher reviewed that infographic media can provide an attractive, effective, and easily accepted form of information for pregnant women. The results show that the use of infographic media is easier to understand, fun because it does not all contain full text and then varied image colours. The findings of this literature show that infographic media can be used as a medium to increase knowledge related to the prevention of hypertension during pregnancy.

**Keywords:** hypertension, pregnant women, infographic media, knowledge

### 1. INTRODUCTION

hypertension is an increase in blood pressure with systolic and diastolic values above the normal threshold. (Saedan et al., 2022; Sufiana et al., 2021). Hypertension is defined as a constant blood pressure with systolic blood pressure greater than 140 mmHg and diastolic blood pressure greater than 90 mmHg. Hypertension is a disease in which the systolic blood pressure is 140 mmHg or higher and the diastolic blood pressure is 90 mmHg or higher. (Gatford et al., 2020; Page et al., 2021). hypertension is the most common disease in pregnant women. Complications of pregnancy (5-10% of pregnancies) About 30% of hypertension is caused by chronic hypertension and 70% is caused by gestational hypertension preeclampsia. This condition usually occurs around the 20th week of pregnancy, but can also occur earlier (Noraisa Hida et al., 2022).

Arterial hypertension is the third leading risk factor for premature death, heart failure and brain damage. The disease is influenced by a person's lifestyle and habits (Chau et al., 2022; Cífková, 2023). It is considered a fatal disease because patients do not realise that they have high blood pressure and are only treated after organ abnormalities due to hypertension appear. Hypertension during pregnancy is an important cause of severe acute illness, long-term disability, and maternal and infant mortality. Nearly 10% of maternal deaths in Asia and Africa are associated with gestational hypertension, and a quarter of maternal deaths in Latin America are due to complications of hypertension (Gatford et al., 2020). The majority of deaths from hypertension can be avoided by providing adequate time and effective treatment to women, especially those with co-morbidities. (Gholami et al., 2022).

The country has a higher MMR than Indonesia, with Myanmar at 250 deaths per 100,000 live births, Laos at 185 deaths per 100,000 live births. The mortality rates in Cambodia, East Timor and the Philippines are still above 100 per 100,000 live births (Garovic et al., 2022). The other five countries in Southeast Asia have better mortality rates of less than 100 deaths per 100,000 live births (Chau et al., 2022). The prevalence of hypertension in pregnancy in Indonesia was found to be 125 cases out of how many pregnant women were diagnosed by health workers. The most feared risks of hypertension during pregnancy are preeclampsia and eclampsia. This is very dangerous for the mother and foetus (Chang et al., 2024; Rana et al., 2019).

Preeclampsia is one of the most common causes of miscarriage or second foetal death. Preeclampsia occurs in about 5% of all pregnancies, 10% of first child pregnancies, and 20 to 25% of pregnant women who had high blood pressure before pregnancy. Preeclampsia can cause low birth weight, miscarriage, and premature birth. (Chang et al., 2024; Teng et al., 2021). This indicates that hypertension is one of the health problems that occur during pregnancy. Hypertension in pregnancy can be detected and managed through pregnancy screening especially in the first and second trimester. Antenatal care can detect signs and symptoms of hypertension in pregnancy early, so as to reduce the risk of mother and foetus. So that information facilities are needed for the community, especially pregnant women. One way to increase knowledge about hypertension in pregnant women is through health education. Health education is a learning process provided with the aim of changing the knowledge and health behaviour of individuals or groups (de Souza Ferreira et al., 2023). The types of health education media used include leaflets, brochures, magazines, flip sheets, booklets, videos, etc. (Andrade et al., 2019).

The development of information technology has made it possible to expand knowledge about pregnant women using various media, including infographics. This medium is a combination of illustration, data, and visualisation. (Talebi et al., 2022). The provision of information visually can attract the interest of the target audience. Infographic media is more attractive because in addition to visual elements, it also uses infographic media that can enhance the information or message to be conveyed. The consistent quality of the created content or graphics helps increase interest by creating a strong impression on the target audience. The quality of a publication is based on the content created with the aim of helping the target understand the topic presented. (Bajpai et al., 2023; Paulo et al., 2024).

Research shows that infographics are able to arouse public interest. This is because the aesthetic value of a visual work coupled with the data or information to be conveyed increases its value. (Thoma et al., 2018). The study revealed that infographic media in the form of animation or video can provide a form of information that is interesting, effective, and easily accepted by students. (Umaroh et al., 2023). The results show that the use of infographic media is easier to generate interest, easier to understand, and has its own uniqueness in conveying information based on facts presented in the desired format. (Paauw et al., 2017; Paulo et al., 2024). Based on the above background, the researcher is interested in conducting a literature review on Increasing Pregnant Women's Knowledge of Hypertension by Using Infographic Media.

## 2. METHOD

The research is a literature review through reviewing, collecting, and synthesising various literature sources relevant to infographic media and hypertension in pregnant women. This research process includes reviewing and critically appraising existing literature sources. The main objective is to understand and describe the state of research in the field related to increasing the knowledge of pregnant women about the incidence of hypertension by using infographic media.

The First Step, identify the topic or research field Increasing Pregnant Women's Knowledge of Hypertension by Using Infographic Media. Furthermore, conducting a thorough literature search using academic databases, scientific journals both international and national, and other reliable sources identified using the Mendeley application obtained 1,245 articles. After filtering based on the publication year 2018-2024, 321 articles were obtained. Furthermore, selection was carried out related to abstracts, full text, open access to the type of research and publication, 48 articles were obtained. The final process was to read and select eligible articles based on the criteria, obtained 35 relevant international articles and then make a clear and structured summary (Table 1). Articles were evaluated based on:

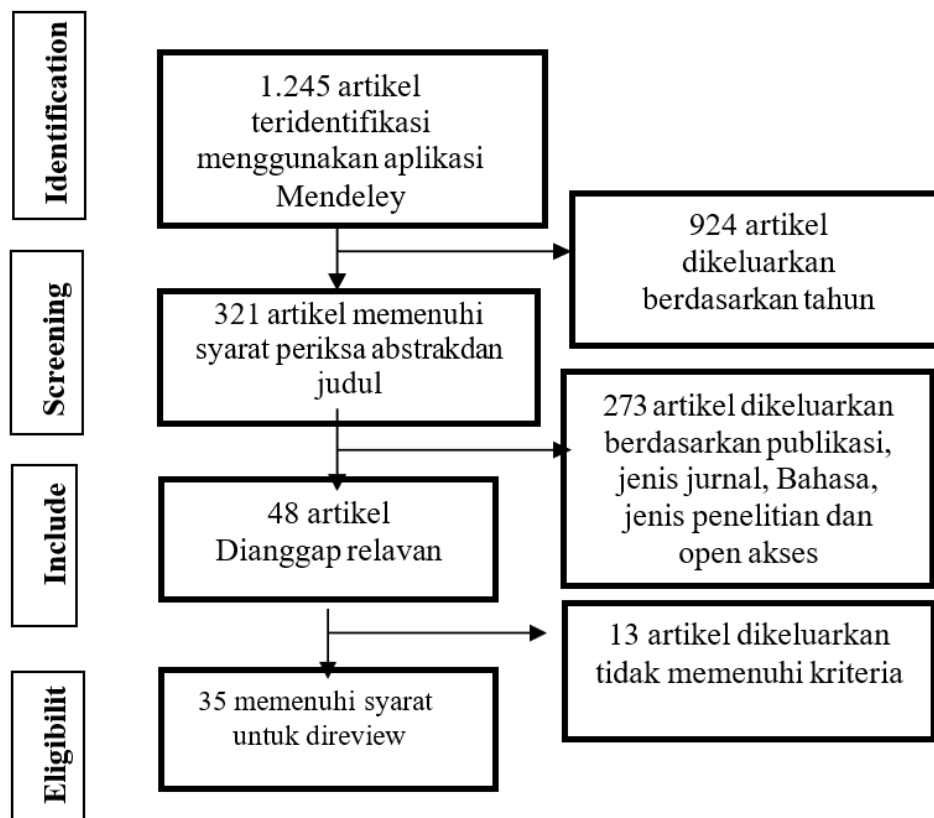
- **Inclusion Criteria**

- Articles discussing the effect of infographic media on the incidence of hypertension in pregnant women
- Publication year 2018-2024
- International and National Publications
- National journals have ISSN
- Articles using English
- Original article, abstract, full text and open access

- **Exclusion Criteria**

- a. Articles other than English
- b. Type of literature review research

The article search strategy can be seen in the scheme below:



Gambar 1. Flow Chart Penelusuran Artikel

### 3. RESULT

Based on the results of data searches on 35 selected articles. Each of these 35 articles was read carefully, starting from the abstract, objectives, research methods, and results. From all of these articles, synthesis using the narrative method by grouping similar extracted data according to the results measured to answer the objectives.

The summary of the research journal was entered into a table according to the format mentioned above. Analysing the content of the journals, then coding the contents of the reviewed journals based on the outline, then looking for similarities and differences in each study discussed to draw conclusions. When abstracting data, the researcher was accompanied by two supervisors who simultaneously reviewed and read all relevant articles and then reached consensus on which articles met the inclusion criteria.

Table 1. Extraction of Research Outcomes

No	Author	Title	Research Type	Sample	Data Analysis	Result
1	(Ely Isnaeni, Wahyu Nur Pratiwi, Sheylla Septina Margareta, Sujatmiko, 2024)	The Influence of Health Education using Booklet Media on the Knowledge of Pregnant Women Experienced with Hypertension in Pregnancy	Pre Experimental dengan metode penelitian One Grup Pre Test Post Test Design	30 respondent	Wilcoxon test	Retrieved from the effect of health education with booklet media on the knowledge of pregnant women who experience hypertension in pregnancy

2	(Ely Isnaeni, Wahyu Nur Pratiwi, Sheylla Septina Margareta, Sujatmiko, 2024)	The Influence of Health Education using Booklet Media on the Knowledge of Pregnant Women Experienced With Hypertension In Pregnancy	Pre Experimental, one Grup Pre Test Post Test Design	30 respondent	Wilcoxon test	Retrieved from the effect of health education with booklet media on the knowledge of pregnant women who experience hypertension in pregnancy
3	(Gingras-Charland et al., 2019)	Pre-eclampsia Educational Tool Impact on Knowledge, Anxiety, and Satisfaction in Pregnant Women: A Randomized Tria	conducted an RCT comparing pregnant with a control group	362 pregnant woman	Two-way ANOVA test	There is an effect related to the tools provided to increase pregnant women's knowledge about pre-eclampsia
4	(Parsa et al., 2019)	Improving the knowledge of pregnant women using a pre-eclampsia app: A controlled before and after study	Case control	110 women	Chi-square, independent sample t-test, paired t-test and linear regression.	<b>The utilisation of mobile-based educational applications improves the knowledge of pregnant women about pre-eclampsia.</b>
5	(Gingras-Charland et al., 2019)	Pre-eclampsia Educational Tool Impact on Knowledge, Anxiety, and Satisfaction in Pregnant Women: A Randomized Trial	conducted an RCT comparing pregnant with a control group	362 pregnant	Two-way ANOVA test	There was an effect related to the tools provided to improve pregnant women's knowledge about pre-eclampsia
6	(José Paulo de Siqueira Guida et al, 2024)	Hypertensive disorders during pregnancy as a major cause of preterm birth and adverse perinatal outcomes: findings from a Brazilian National Survey	cross-sectional analysis	4,150 women	Cox regression	The hypertension pregnancy interruption is common in women with preterm birth, and provider-initiated preterm birth is the leading cause of preterm birth in this group.
7	(Sindi et al., 2022)	The Effectiveness	pre-	30 responden	Wilcoxon	There is effectiveness

	of Audiovisual About Danger Signs of Pregnancy With Pregnant Women's Knowledge	experimental one group pretest-posttest design		test	of audiovisual about pregnancy danger signs to increase knowledge of pregnant women
8	(Haoyue Teng et al, 2021) Gestational systolic blood pressure trajectories and risk of adverse maternal and perinatal outcomes in Chinese women	extracted from Taicang register-based cohort	20,353 mothers without chronic hypertension	of variance (ANOVA) for normal distributed variables and Kruskal Wallis test	The monitoring of blood pressure during pregnancy is necessary, especially for women with high blood pressure SBP in early pregnancy or upward trajectory.
9	(Ilmiynai et al., 2024) Telehealth Education for Pregnant Women as an Effort to Increase Knowledge about Hypertension in Pregnancy	Quasi-experiment research (pseudo-experiment).	56 responden	Uji Paired T-test	There was a significant difference between the values before and after education through pre-test and post-test delivered with telehealth media.
10	(Stang et al., 2020) The Effect of Educational Media Development in Increasing Knowledge and Attitudes on Pregnancy Complications at Sayang Rakyat Hospital in Makassar	Quasi-experimental design with a pretest-posttest control group design	30 responden	Wilcoxon test Signed Ranks Test and Mann-Whitney test	The educational media on knowledge and attitudes about complications of pregnancy and childbirth have a positive effect on pregnant women at Sayang Rakyat Hospital Makassar.
11	(Talebi et al., 2022) Examination of influence of social media education through mobile phones on the change in physical activity and sedentary behavior in pregnant women: a randomized controlled trial	Randomised controlled trial study with parallel groups	90 pregnant woman	Anova test	Education intervention based on social networking through mobile phones has an effective role in behaviour change in physical activity during pregnancy.
12	(Ilmiynai et al., 2024) Telehealth Education for Pregnant Women as an Effort to Increase	quasi-experiment research (pseudo-experiment).	56 respondent	Paired T-test	There was a significant difference between the values before and after education through

		Knowledge about Hypertension in Pregnancy				pre-test and post-test delivered with telehealth media.
13	(Noraisa Hida et al., 2022)	Awareness of Hypertension in Reproductive-Aged Women Living With Chronic Kidney Disease	interview and chart review	63 participants	Mann-Whitney U and Fisher's exact test	an essential component for hypertension management, further needed to optimise cardiovascular disease risk reduction
14	(Jahan et al., 2021)	Assessment of health education infographics Saudi Arabia	Cross-sectional review	279 respondent	by a one-way analysis of variance (ANOVA)	Infographics can be used as a promotional medium that focuses on chronic diseases and healthy lifestyles.
15	(Coyne et al., 2021)	Effectiveness of Infographics at Disseminating Health Information During the COVID-19 Pandemic	longitudinal study	64 respondent	Chi-Square test	The infographic can be used as a promotional medium that focuses on chronic diseases and healthy lifestyles
16	(Chu et al., 2024)	Using infographics in disseminating healthy lifestyle information on social media is likely to increase uptake and sharing	online survey	204 respondent	Kruskal–Wallis (ANOVA)	The social media facilitates interpersonal communication, information exchange and knowledge sharing, and infographics can attract people to healthy lifestyles and relevant fitness information items
17	(Kusumawaty Jajuk et al., 2021)	The Effect of Progressive Muscle Relaxation Using Audio-Visual Media on Blood Pressure Reduction in Elderly Hypertension Patients	Pre-experimental method with one group pretest-posttest design	24 respondents	Paired -t-test	Muscular relaxation affects blood pressure reduction in the elderly hypertensive patients with audio-visual media
18	(Suratun et al., 2022)	The Effect of Multimedia-Based Education on the Management of Hypertension on Behavioral Change	quasi-experimental pre-post and post-test with control group	64 respondents	Multiple Logistics Regression	There were significant differences in multimedia-based education on respondents'

		for Stroke Prevention	design.			behaviour change for stroke prevention.
19	(Jahan et al., 2021)	Assessment of health education infographics in Saudi Arabia	Cross-sectional review	279 respondent	by a one-way analysis of variance (ANOVA)	Infographics can be used as a promotional medium that focuses on chronic diseases and healthy lifestyles.
20	(Mitasari et al., 2019)	The influence of Counselling through Social Media to knowledge and practice of the management of Hypertension	Quasy Eksperimen Non Randomized Control Group Pretest Posttest	52 responden	Paired t test and independen t t test.	The effects of social media counselling and conventional counselling counselling and conventional counselling on knowledge about hypertension
21	(Manurung et al., 2022)	Sildenafil During Pregnancy A Preclinical Meta-Analysis on Fetal Growth and Maternal Blood Pressure	online-only Data Supplement	459 respondents	Meta-regression analyses	The blood pressure of the mother during pregnancy FGR and preeclampsia. Largest good effect for foetal growth with a dose of lThe blood pressure of the mother during pregnancy FGR and preeclampsia. Largest good effect for foetal growth at doses greater than those currently used in human studies.
22	(Kusumawaty Jajuk et al., 2021)	The Effect of Progressive Muscle Relaxation Using Audio-Visual Media on Blood Pressure Reduction in Elderly Hypertension Patients	preexperimental method with one group pretest-posttest design	24 respondents	Paired -t-test	Relaxation of muscles affects blood pressure reduction in the elderly hypertensive patients with audio-visual media
23	(Suratun et al., 2022)	The Effect of Multimedia-Based Education on the Management of Hypertension on Behavioral Change for Stroke Prevention	quasi-experimental pre-post and post-test with control group design.	64 respondents	Multiple Logistics Regression	There were significant differences in multimedia-based education on respondents' behaviour change for stroke prevention.
24	(Tasnim & Gatra, n.d.)	The Effect Of Health Education Using Video To Increase	Pre-Experimental Study using the Pretest-Posttest	74 responden	Wilcoxon Sign Rank Test	Effective health education using video media to improve community



		Community Knowledge And Attitude Regarding Hypertension Diseases In Terebino Village	Designs.			knowledge and attitudes about the prevention of hypertension
25	(Umaroh et al., 2023)	Pretesting of Infographic as a Communication Tool on Pregnant Women During Covid-19 Period	Qualitative with Rapid Assessment Procedure (RAP) and communication theory pre-testing	3 Pregnant woman	Data were analysed using thematic analysis.	The infographic can be used to increase the knowledge of pregnant women
26	(Indriyani & Sudiyat, 2023)	The Effect of Educational Poster Media About Hypertension Control on	quasi-experimental design	141 respondents	Uji Paired T-test	<b>The infographics. hypertension control poster media education on hypertension knowledge</b>
27	(de Souza Ferreira et al., 2023)	Child vaccination in animated infographic: technology for permanent education about the nursing process	the methodological study of technology production and validation	45 respondents	By absolute and relative frequency distribution .	The infographic of tools for use by nursing students and professionals
28	(Apriyanti et al., 2020)	Infographic instructional media as a solution and innovation in physics learning for senior high school students in Indonesia	Design and Development Research (DDR)	The sample of this research was grade X students from one of the senior high schools located in Semparuk sub-district, Sambas Regency in 2016/2017, with a total of 6 students	Qualitative Data Analysis Model. Data is analyzed thematically and then transcribed with Microsoft Word.	Use of infographic is very helpful and useful for students to understand the Physics concept of rectilinear motions kinematics. Finally, from the perspective of students as infographic instructional media users, it can be concluded that the infographic is an effective solution to Physics learning due to it is more flexible, stimulates learning, and students can develop their own concepts that solve Physics learning problems.
29	(Ozdamli & Ozdal, 2018)	<a href="#">Developing an instructional design for the design of infographics and the evaluation of</a>	Quantitative studies	The study group of the research consists of 43 teachers	In the research, an instructional design was	Teachers used the infographics that they had developed according to the course contents for



	<a href="#">infographic usage in teaching based on teacher and student opinions</a>		and 51 elementary school students from elementary schools in Cyprus	developed based on the ADDIE model for infographic design. The ADDIE model consists of Analysis, Design, Development, Implementation and Evaluation”	eight weeks in their courses after the training was completed and observed the impact of infographics in terms of different dimensions. At the end of the implementation, it was found that both teachers and students had positive opinions on the usage of infographics in learning environments.
30	(Campbell et al., 2022) Parental Knowledge, Self-confidence, and Usability Evaluation of a Web-Based Infographic for Pediatric Concussion: Multimethod Study	multimethod research design	28 participants	Wilcoxon signed-rank tests	the use of web-based infographics as a knowledge translation intervention to increase parents' confidence in managing child concussion
31	(Sufiana et al., 2021) User generated content: Cybernetic infographic visual narrative	Qualitative with Talcott Parsons	13 respondents	Narrative	The visual narrative of HaiBunda.com's infographic is themed 'Did you know'. Educative, informative and contains
32	(Saedan et al., 2022) Effectiveness of health education on knowledge and perception about pregnancy induced hypertension among Princess Nourah Bint Abdulrahman University students, Saudi Arabia	Quasi-experimental study	42 respondents	Chi-square	The health education intervention was effective in improving knowledge and perceptions of the intervention Group
33	(Huang et al., 2018) The effect of an infographic promotion on research dissemination and readership: A randomized	Research study	24 artikel	Unpaired two-tailed t-tests	<b>The infographic can increase user interest to be used effectively in promotional media</b>

controlled trial						
34	(Indriyani & Sudiyat, 2023)	<i>The Effect of Educational Poster Media About Hypertension Control on Knowledge of Hypertension Patients</i>	<i>quasi-experimental design</i>	141 respondents	Uji Paired T-test	<b>The Effects of hypertension control poster media education on hypertension knowledge</b>
35	( Diane KorbI et al, 2024)	Population-based study of eclampsia: Lessons learnt to improve maternity care	EPIMOMS population-based study	182.309 maternities	Chi2, Fisher exact tests	<b>The pregnant woman has a history of hypertension may be at risk of hypertension in pregnancy</b>

#### 4. DISCUSSION

Hypertension during pregnancy is one of the leading causes of maternal and child morbidity and mortality worldwide.(Garovic et al., 2022). FThe factors that cause the level of knowledge of hypertensive pregnant women is not maximised due to the lack of information about controlling hypertension(Barik et al., 2019). The health education is a learning process given to individuals or groups that aims to change their health behaviour towards the symptoms and prevention of hypertension, one of which is infographic media. Infographic media is currently in demand by the public because of its audio-visual nature, easy access, and attractiveness(Saedan et al., 2022; Sufiana et al., 2021). The infographics media is a form of communication through information media presented in the form of text, and combined with several visual elements such as images, illustrations, graphics, and typography. Infographics present complex information quickly and clearly. Infographics combine research and storytelling with visual design that conveys a memorable message.(Kanchan & Gaidhane, 2023).

The objectives of infographics can be categorised into three audience communication objectives: to inform, entertain, or persuade the audience. (de Souza Ferreira et al., 2023; Dorneles et al., 2020). The infographic has a way of introducing and getting the audience's attention. Communicating specialised knowledge to diverse populations is a skill important for health education and promotion (Campbell et al., 2022; Garovic et al., 2022).

The infographic media engages the senses of hearing and vision simultaneously (Bradshaw & Porter, 2017; Tay et al., 2023). This type of message that can be conveyed through the media can be in the form of verbal and nonverbal messages that are heard such as visual media, and verbal messages that are heard such as audio media, which are media tools that play a role in conveying messages. (Andrade et al., 2019). The alternative is to use a series of messages as learning materials through audio or audio recorded on a voice recorder and played to respondents using a player. A communication process is considered effective if the message sent is received completely and not boring.(Rahayu & Kurniasari, 2021).

The infographic is a new way of communicating information that is very effective in today's world (Huang et al., 2018). The infographic manipulates text data and facilitates understanding through various attractive data visualisation techniques. Infographics help people understand complex concepts more easily and quickly. Infographics are information displayed in graphic form (Gingras-Charland et al., 2019; Parsa et al., 2019).

Consistent with research(Mc Sween-Cadieux et al., 2021), The study shows that learning using infographic media provides excellent visual material that is easy to remember and understand to be used as learning materials. (Sindi et al., 2022) The results showed that a person's level of education influences the process of receiving information. This shows that pregnant women who have realised the importance of health, especially the incidence of hypertension in pregnancy, and try to obtain health information from health sources through health services and other media. (Nugraha et al., 2023).

The infographic media use in learning is very effective and in fact it is an interactive learning method because the infographic media is created to facilitate the understanding of the material provided and provides several visual aesthetic elements such as images, colours, sounds, terrain, etc. This is done so that the infographic media is attractive and allows respondents to play an active role in the learning process.(Stang et al., 2020).

The usage of animated videos can improve students' learning outcomes(Coyne et al., 2021). Furthermore, animated videos are very influential in learning because they are proven to attract attention, increase knowledge retention, and allow

visualisation of imagined concepts, objects, and their relationships. Audiovisual media has a positive impact on improving attitudes and knowledge. (Chu et al., 2024), This suggests that the use of audiovisual media is effective in health education, especially hypertension prevention awareness. (Ilmiynai et al., 2024; Talebi et al., 2022). Furthermore, this audiovisual medium can also accommodate limited time, space and location, and has the ability to play videos on demand, resulting in a deeper understanding of the subject and improved health behaviour. (Mc Sween-Cadieux et al., 2021; Thoma et al., 2018). The advantages of visual communication through infographics include: By visualising data in the form of attractive graphics, it is easier to convey to the public. (Coyne et al., 2021; Widiati & Rahmawati, 2022(Jahan et al., 2021) ).This is mainly because the human eye is quicker to capture information presented in a visual (graphic) format than in a text format, so it tends to pay more attention to reading the content of the message conveyed. (Nugraha et al., 2023).

## 5. CONCLUSION

The infographic media can increase the knowledge of pregnant women, especially related to the incidence of hypertension. Where, this media combines illustrations, data and visualisations and the delivery of information about hypertension visually will be able to attract the target's interest. Infographic media can be used to increase the knowledge of pregnant women about hypertension prevention to the community, especially pregnant women..

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