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Three Delays Model and its Determinants for Maternal Death: A Descriptive Cross- Sectional Study

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Abstract

Introduction: Despite significant improvements in reducing maternal mortality in Nepal, preventable deaths persist due to gaps in timely care-seeking, access, and service delivery. The 'Three Delays Model' offers a framework to examine delays contributing to maternal mortality and guide targeted interventions. This study was done to identify the types of delays, patterns, and characteristics contributing to these maternal deaths.

Methods: A descriptive cross-sectional study of maternal deaths was conducted at Patan Academy of Health Sciences, Patan Hospital, Nepal, from July 2021 to July 2024 after ethical clearance (Reference number: drs 2506202030). Data were extracted from hospital records and maternal mortality audit reports. The 'Three Delays Model' was applied to categorize barriers: delay 1-decision to seek care, delay 2-reaching care, and delay 3-receiving adequate care. Descriptive analysis was performed using Microsoft Excel.

Results: This study identified 16 maternal deaths over three years, with the highest mortality among primigravida women in late pregnancy and postpartum periods. Indirect causes were predominant than direct obstetric causes. The indirect causes of maternal death were severe COVID-19 pneumonia, acute respiratory distress syndrome, pneumothorax, pulmonary embolism, and septicemia secondary to lupus nephritis. Delay in seeking health care was the most prevalent, followed by the delay in receiving care.

Conclusions: Maternal deaths remain influenced by behavioral and systemic factors, with Delay 1 as the most prevalent underlying cause, followed by Delay 3.

Keywords: *causes; maternal mortality; three delays model.*

Introduction

Maternal mortality is defined as the death of a woman during pregnancy or within 42 days of termination, from any cause related to or aggravated by the pregnancy or its management, excluding accidental or incidental causes. Despite advancements in maternal health care, preventable maternal deaths continue to pose a global health challenge, especially in economically disadvantaged regions.[1] Nepal, like many countries in Southern Asia, has made significant strides in reducing maternal mortality, from 539 (1996) to 151 per 100,000 live births (2021).[2] Maternal deaths resulting from obstetric complications of the pregnancy state (pregnancy, labor, and the puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above are termed as the direct maternal deaths. While indirect maternal deaths are maternal deaths resulting from previous existing disease or a disease that developed during pregnancy and which are not due to direct obstetric

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causes, but which are aggravated by physiologic effects of pregnancy.[1,3]

Addressing delays in seeking, accessing, and receiving care is essential step to improve maternal health outcomes. Identifying the underlying factors of the delays resulting in the maternal mortality is essential for designing effective interventions to prevent the avoidable maternal deaths.[4] The first delay is 'delay in deciding to seek care' which is due to lack of awareness of pregnancy-related complications, sociocultural beliefs, financial constraints or women's lack of autonomy. The second delay is 'delay in reaching a health facility' which involves barriers like long distances to healthcare centers, poor road conditions, lack of transportation or high transportation costs. The third delay is the 'delay in receiving adequate care' in a facility, which can occur due to inadequate staffing, poorly trained personnel, lack of essential drugs/ equipment or poor facility management.[4,5] This study was done to explore the various delays and its underlying factors leading to the maternal deaths in a hospital setting.

Methods

It was a descriptive cross-sectional study done at the Department of Obstetrics and Gynecology, Patan Hospital, Patan Academy of Health Sciences- a multi-disciplinary tertiary referral hospital of the Lalitpur district of Nepal. Ethical approval for the study was obtained from the Institutional Review Committee of the hospital (Reference number: drs 2506202030). It included all the maternal deaths of three years (16th July 2021-15th July 2024). Women of 12-55 years whose death had occurred in the Patan Hospital during their pregnancy (irrespective of site and period of gestation) or within 42 days postpartum from obstetric and non-obstetric causes which were related to or aggravated by the pregnancy or its management were included in the study. Accidental deaths, deaths due to suicide, and incomplete databases were excluded from the analysis.

Purposive sampling was done, and all maternal deaths fulfilling the selection criteria during the study period were collected from the medical records section of the Patan Hospital. Data collection tools used were a structured data collection checklist, maternal death record forms, referral logs, hospital-based maternal mortality audit reports, three delay framework. Relevant medical records were evaluated to find out the type of maternal death, etiology of maternal death, delays contributing to those deaths and the characteristics determinants of the delays. As per the hospital protocol, all the maternal deaths were reviewed and verbal autopsy was done by Maternal and Perinatal Death Surveillance and Response (MPDSR) committee within 24 hours of the maternal death and the associated delays were identified and recorded in the audit form. These hospital-based maternal mortality audit reports were utilized to map the delays as per the three-delay framework by utilizing the structured questionnaires.

In order to identify the type 1 delay, the audit report was reviewed to access whether the women or her family members sought medical care late or underestimated the severity of complications. Socio-cultural factors, financial constraints, and lack of awareness about danger signs leading to this delay were recorded for each case. For the type 2 delay, transportation challenges, distance to the health care center and availability of the emergency transport were recorded from the audit from for each maternal death. For type 3 delays, referral status, shortage of the trained healthcare providers, limited availability of the essential medical equipment, blood transfusion services or surgical facilities in the health care center were recorded. Other factors leading to the delay in the diagnosis and initiation of the life-saving interventions were also accessed from the hospital-based mortality report. Data were collected based on the predesigned proforma and entered in MS excel. Descriptive analysis was conducted and the results were presented as frequencies, percentages and illustrated using tables. Root cause analysis was done to map the delays.

Results

Over a three-year period (2021/22–2023/24), a total of 16 maternal deaths were recorded. The majority occurred among women aged 21–30 years (62.5%), with no deaths reported in women aged ≤20 years. Mortality declined with increasing age above 30. Primigravida women accounted for 50% of deaths, suggesting elevated risk during first pregnancies, while multigravida women comprised the remainder, with progressively fewer deaths among those with higher parity. For the majority (75%) of the women who had maternal death, Patan hospital was the first contact point while one fourth of them were only referred from the tertiary hospitals within the valley. There were 10(62.5%) maternal deaths in the third trimester, six (37.5%) in the second trimester and no maternal deaths during the first trimester, indicating late pregnancy as a particularly high-risk period. Among the analyzed cases, two antepartum deaths (12.5%) were documented, with no intra-partum deaths. Postpartum deaths occurring after 48 hours were most frequent (11 cases, 68.75%), followed by two deaths within 48 hours postpartum/ post-abortion and one death within the first 24 hours postpartum (Table 1 and 2).

Table 1: Demographic and obstetric parameters of maternal deaths (n=16).

Parameters	2021/ 2022	2022/ 2023	2023/ 2024	Total n(%)
Age group (years)				
21-25	2	1	2	5(31.25)
26-30	2	1	2	5(31.25)
31-35	2	1	-	3(18.75)
36-40	1	-	-	1(6.25)
41-45	1	-	-	1(6.25)
≥ 46	-	1	-	1(6.25)
Gravidity				
G_1	4	2	2	8(5-)
G_2	2	2	1	5(31.25)
G_3	1	-	-	1(6.25)
≥ G_4	1	-	1	2(12.5)
Referral status				
Not referred	6	3	3	12(75)
Referred in	2	1	1	4(25)

Table 2: Timing and types of maternal deaths (n=16).

Parameters	2021/ 2022	2022/ 2023	2023/ 2024	Total n(%)
Time during antenatal period				
First trimester	-	-	-	-
Second trimester	2	2	2	6(37.5-)
Third trimester	6	2	2	1-(62.5-)
Time of maternal death				
Antepartum	2	-	-	2(12.5-)
Intra-partum	-	-	-	-
<24 hours Postpartum/abortion	-	1	-	1(6.25)
<48 hours Postpartum/abortion	1	-	1	2(12.5-)
>48 hours Postpartum/abortion	5	3	3	11(68.75)
Type of maternal death				
Direct Obstetric death	1	-	3	4(25)
Indirect Obstetric death	7	4	-	11(68.75)
Unspecified	-	1	-	1(6.25)

Of the 16 maternal deaths, 68.75% were attributed to indirect causes, while 25% resulted from direct obstetric causes and one case (6.25%) was classified as unspecified. Among the 11 indirect deaths, six were due to severe COVID-19 pneumonia, two to acute respiratory distress syndrome (ARDS), and one each to pneumothorax, pulmonary embolism, and septicemia secondary to lupus nephritis. Direct maternal deaths were concentrated in 2022/23 and 2023/24, with one case each of severe pre-eclampsia, induced abortion, antepartum hemorrhage associated with placenta accreta spectrum, and pulmonary embolism/deep vein thrombosis (Table 3).

Table 3: Categories and causes of maternal death (n=16).

Type	Categories	Cause of death	2021/ 2022	2022/ 2023	2023/ 2024	Total n(%)
Direct	Pregnancy with abortive outcome	Induced Abortion	-	-	1	1(6.2-)
	Hypertensive disorders of pregnancy (HDP)	Severe pre-eclampsia	-	-	1	1 (12.5-)
	Obstetric hemorrhage	APH with PAS	-	-	1	1(6.2-)
	Pregnancy related infection		-	-	-	-
	Other obstetric complication	Pulmonary embolism/DVT	1	-	-	1(6.2-)
	Unanticipated complications of management		-	-	-	-
Indirect	Non-obstetric causes*		7	3	1	11(68.75)
Unspecified	Undetermined cause		-	1	-	1(6.2-)

*Non-obstetric causes: severe COVID-19 pneumonia-6; acute respiratory distress syndrome-2; one case each of pneumothorax, pulmonary embolism, and septicemia secondary to lupus nephritis.

An assessment of Type 1 delay (decision to seek care) revealed significant behavioral and perceptual barriers. The most frequently cited factor was low perceived severity of symptoms (8 cases, 50%), indicating underestimation of obstetric complications. Lack of trust in health services was

reported in seven cases (43.75%), while lack of awareness of maternal danger signs contributed to four cases (25%). Cultural beliefs and practices were implicated in two cases (12.5%), and financial constraints in one case (6.25%). No deaths were linked to gender inequality, previous negative healthcare experiences, social stigma, or intentional delay in seeking care (Table 4).

Table 4: Factors causing delay in seeking health care delay-1 (n=16).

Determinants	2021/ 2022	2022/ 2023	2023/ 2024	Total
a. Lack of awareness	2	1	1	4
b. Low perceived severity	3	2	3	8
c. Cultural beliefs and practices	-	-	2	2
d. Financial constraints	-	-	1	1
e. Lack of trust in health services	3	2	2	7
Total	8	5	9	22

There were no Type 2 delay (reaching a health facility) in this study. In contrast, Type 3 delay (receiving adequate care at the facility) was influenced by multiple factors. The most frequent issue was delay in referral to a higher level center (2 cases), followed by one case each of lack of trained healthcare providers, shortage of essential supplies or machines, limited availability of the COVID vaccine, inter-departmental communication gaps, and insufficient COVID-ICU beds. None of the maternal deaths were linked to disrespectful care, language barriers, protocol failure, or limited operating hours (Table 5).

Table 5: Factors causing delay in receiving adequate and appropriate care (delay 3) (n=16).

Determinants	2021/ 2022	2022/ 2023	2023/ 2024	Total
a. Lack of trained healthcare providers	-	1	-	1
b. Shortage of essential supplies /machines	1	-	-	1
c. Delay in referral to higher center	1	1	-	2
d. Lack of vaccine	1	-	-	1
e. Lack of inter-department communication	1	-	-	1
f. Lack of ICU bed	1	-	-	1
Total	5	2	-	7

Root cause analysis revealed that Delay 1 was predominantly driven by human factors including lack of awareness, cultural beliefs, and traditional practices accounting for 14 of 21 mentions (66.7%). Health system mistrust contributed to seven cases, and financial constraints to one. For Delay 3, six cases were documented, with root causes including equipment and supply shortages (two cases), communication gaps (one case), and health system limitations such as lack of trained staff and ICU beds (two cases). Overall, human and systemic factors were responsible for 24 of 28 root cause mentions (Table 6).

Table 6: Mapping of root causes to delays of maternal mortality (n=16).

Root cause category	Type of Delay	Number
Human factors	Delay-1, Delay-3	15
Financial constraints	Delay-1	1
Equipment/supplies	Delay-1	2
Communication	Delay-1	2
Health system	Delay-1, Delay-3	9

Discussion

Despite commendable decrease in maternal mortality ratio, Nepal still remains off-track to meet Sustainable Development Goal targets for maternal health.[6] Recent findings from the Nepal Demographic and Health Survey reveal that only 51% of women completed the full continuum of maternal and newborn health services, signaling critical gaps in care delivery.[7] These gaps are strongly associated with socio-demographic determinants, including household wealth, maternal education, urban–rural disparities, and access to digital resources.[7,8]

In this study, women aged 21–30, especially primigravidas, demonstrated heightened vulnerability to maternal mortality which may be due to biological and psychosocial factors inherent in early reproductive age.[7] Notably, 68.75% of maternal deaths occurred more than 48 hours postpartum, emphasizing deficiencies in postnatal surveillance, emergency preparedness, and institutional responsiveness. Most indirect deaths occurred in 2021/22, reflecting the clinical impact of the COVID-19 pandemic. Further complicating the landscape is the predominance of indirect obstetric deaths (56.25%) in this study including conditions such as COVID-19 pneumonia, acute respiratory distress syndrome (ARDS), and lupus nephritis. These findings reflect a shift in maternal risk profiles and underscore the need to integrate obstetric services with broader health systems, particularly respiratory and autoimmune disease management.[9] The World Health Organization's 2023 report similarly

emphasizes the imperative for cross-disciplinary readiness to reduce maternal deaths from systemic comorbidities.[1] In comparison, direct obstetric deaths (37.50%) primarily from pre-eclampsia and obstetric hemorrhage reiterate the urgency of expanding access to blood products, surgical capacity, and intensive care services. Similarly, disparities in emergency obstetric care remain pronounced in Nepal's rural districts, where infrastructural constraints and geographic remoteness persist.[7,2] Notably, the absence of intrapartum deaths in this cohort may reflect the effectiveness of facility-based labor management protocols. A five year retrospective study from B.P. Koirala Institute of Health Sciences supports these insights, with nearly 75% of deaths deemed avoidable. Corresponding to this study the common causes were obstetric hemorrhage, hypertensive disorders, and sepsis.[9]

Collectively, the persistence of preventable maternal deaths across direct and indirect causes reaffirms the relevance of the 'Three Delays Model' proposed by Thaddeus and Maine.[4] Nepal's maternal mortality landscape continues to be shaped by a complex interplay of behavioral, systemic, and clinical factors. Interventions must therefore be multi-sectoral integrating clinical improvement, community empowerment, and infrastructural reform to advance toward SDG targets and maternal health equity. The application of the Three Delays Model remains a robust framework for interpreting these multifaceted challenges. Santos et al. reaffirm that the Three Delays Model remains an essential tool for diagnosing systemic barriers and guiding equity driven strategies.[10]

Similar to this study, Delay 1-failure to decide to seek care was the predominant contributor, accounting for 43% of maternal deaths in a study done in Nepal.[7] This delay reflects deep-rooted sociocultural barriers such as poor health literacy, low perceived severity of symptoms, and insufficient antenatal engagement. Similar patterns are documented in Nepal's hilly districts, where geographic isolation and inadequate transportation infrastructure exacerbate delays in reaching care, type 2 delay.[11] In contrary, there were no Type 2 delay in this study as all the 4 refereed-in cases were from the hospitals within the valley suggesting improved physical access or possible underreporting during the verbal autopsy. Similarly, in another study, over 40% of cases involved Delay 1 factors with determinants as delayed decision making and poor birth preparedness.[9] In contrast, facility-based studies from Egypt underscore the dominance of Delay 3-receiving appropriate care linked to 88.9% of maternal deaths. This delay reflects systemic issues such as delayed referrals, supply shortages, and understaffed emergency departments. A noteworthy 20% of Egyptian women experienced all three delays, underscoring the compounded nature of maternal mortality risk in low-resource settings.[12] Complementary narrative based research from Malawi revealed that maternal deaths often result from overlapping delays, including institutional mismanagement and referral breakdowns resonating with findings from Nepal's tertiary settings.[13] Root cause analysis anchored in the Three Delays Model identified Delay 1 as the most prominent contributor to maternal mortality, affecting 14 cases in this study. This delay was largely driven by human factors, including limited awareness, cultural norms, and poor recognition of complications. Institutional mistrust, noted in seven cases, further underlined gaps in public confidence toward health systems. Delay 3-receiving adequate care was implicated in six cases and associated with shortages in equipment, trained personnel, and breakdowns in interdepartmental coordination. Financial constraints and communication failures were also documented, though less frequently. These findings align with longstanding evidence that maternal mortality is shaped by both behavioral and systemic failures.[1,4,8]

The continued relevance of the Three Delays Model in Nepal is reinforced by multiple facility-based studies. In a study done at three tertiary hospitals, 85% of maternal deaths or near miss cases involved at least one delay, with Delay 1 in 63%, Delay 2 in 52%, and Delay 3 in 55% of cases.[14] Another study using postpartum exit interviews, noted that Delay 2 was most prevalent (47%), followed by Delay 1 (11%) and Delay 3 (6%). Their analysis revealed that higher education levels, accompaniment during facility visits, and well-equipped facilities were protective against delays.[15] Similarly, in a district level study, found equal contributions from Delay 1 and Delay 3 (25.8% each), with 43.5% of maternal deaths involving overlapping delays. Key barriers included low perceived need for care, reliance on traditional birth practices, poor service readiness, and weak referral systems.[16] Similar patterns were observed in India, where 43% of maternal deaths were linked to Delay 1, driven by cultural factors and low awareness. Delay 3 contributed to 13% of deaths, highlighting gaps in facility-level response.[5] In another study from India, 75% of hypertensive maternal deaths were attributed to Delay 1, regarding care-seeking hesitation influenced by low awareness and cultural perceptions.[16] A study analyzing verbal autopsy narratives from Pakistan and Mozambique, proposed a shift from delay-based models to a continuity of care perspective. They emphasized fragmented care pathways and inconsistent referrals as more consequential to maternal outcomes than isolated delays an observation particularly relevant to the finding of this study which involves more of

indirect deaths and late postpartum complications.[17] A study done in Africa concluded that community engagement and facility readiness were crucial for reducing maternal mortality and improving household decision-making to reducing type 1 delay.[18] Similar findings were seen in studies done in Indonesia.[19,20] A systematic review concluded that improving maternal outcomes requires health system reforms targeting not just access, but also the reliability, responsiveness, and quality of facility based care.[21] A multi-national study concluded that culturally sensitive education, timely emergency obstetric care, and context-driven interventions are needed to build resilient, sustainable maternal health systems in low-resource settings in order to substantially decrease the delays.[22]

The limitation of this study is that it is a single centered hospital-based study. Similar study including all the maternal deaths at multiple referral hospitals including community level would be better in finding the deep-rooted determinants of the first and second delays. Addressing Delay 1 requires culturally sensitive health education, community empowerment, and digital inclusion to improve maternal health literacy and service uptake. Key priorities may include strengthening culturally sensitive health education, rebuilding trust through consistent, high-quality clinical care, enhancing referral coordination, expanding emergency obstetric services and embedding behavioral insights into surveillance and audit systems.

Conclusions

This study delineates the multidimensional nature of maternal mortality in a tertiary hospital in Nepal, emphasizing clinical, behavioral, and systemic factors that collectively drive preventable outcomes. A pronounced concentration of deaths among primigravida women in the third trimester and postpartum period underscores critical windows for targeted intervention. Analysis through the Three Delays Model reveals that behavioral barriers particularly low symptom perception, limited health literacy, and institutional mistrust-persist as major impediments to timely care-seeking. Although physical access to facilities has improved, gaps remain in facility readiness, referral mechanisms, and emergency response capacity, especially evident in late postpartum deaths.

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References

1. World Health Organization, United Nations Children's Fund, United Nations Population Fund, World Bank Group, United Nations Department of Economic and Social Affairs, Population Division. Trends in Maternal Mortality 2000 to 2020: Estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. Geneva: World Health Organization; 2023. Available from: https://www.who.int/publications/i/item/9789240068759
2. New ERA. Nepal Demographic and Health Survey 2022: Key Indicators Report. Ministry of Health and Population; 2022. Available from: https://www.newera.com.np/ongoing-research/2022-nepal-demographic-health-survey-ndhs
3. World Health Organization. The WHO Application of ICD-10 to Deaths During Pregnancy, Childbirth and Puerperium: ICD-MM; 2012. Available from: https://www.who.int/publications/i/item/9789241548458.
4. Thaddeus S, Maine D. Too Far to Walk: Maternal Mortality in Context. Soc Sci Med. 1994 Apr;38(8):1091-110. DOI: 10.1016/0277-9536(94)90226-7
5. Agrawal N, Patel S, Badkur M. Three Delay Model: To Find Out the Reason for Maternal Deaths. Int J Res Med Sci. 2020;8:1273-6. DOI: 10.18203/2320-6012.ijrms20201308
6. Thapa S. Maternal Mortality Levels and Trends in Nepal: A Brief Update. J Nepal Health Res Counc. 2021;19(1):196-200. DOI: 10.33314/jnhrc.v19i1.3169

7. Pandey AR, Adhikari B, Sangroula RK, et al. Continuum of Care for Maternal and Newborn Health Services in Nepal: Analysis From Demographic and Health Survey 2022. PLoS One. 2025;20(3):e0319033. DOI: 10.1371/journal.pone.0319033

8. G.C.S, Adhikari N. Decomposing Inequality in Maternal and Child Health Services in Nepal. BMC Public Health. 2023;23:1185. DOI: 10.1186/s12889-023-15906-2

9. Sitaula S, Basnet T, Agrawal A, et al. Prevalence and Risk Factors for Maternal Mortality at a Tertiary Care Centre in Eastern Nepal. BMC Pregnancy Childbirth. 2021;21:471. DOI: 10.1186/s12884-021-03920-4

10. Santos PSP, Belém JM, Callou Cruz RSL, et al. Applicability of the Three Delays Model in Maternal Mortality: Integrative Review. Saúde Debate. 2022;46(135):1187-1201. DOI: 10.1590/0103-1104202213517

11. Shrestha B. Maternal Mortality in Hilly Districts of Nepal. J Inst Med Nepal. 2009;31(2):7-13. DOI: 10.59779/jiomnepal.383

12. Mohammed MM, El Gelany S, Eladwy AR, et al. A Ten-Year Analysis of Maternal Deaths in a Tertiary Hospital Using the Three Delays Model. BMC Pregnancy Childbirth. 2020;20:585. DOI: 10.1186/s12884-020-03262-7

13. Combs Thorsen V, Sundby J, Malata A. Piecing Together the Maternal Death Puzzle Through Narratives: The Three Delays Model Revisited. PLoS One. 2012;7(12):e52090. DOI: 10.1371/journal.pone.0052090

14. Maharjan N, Shrestha R, Singh S, Gautam B. Maternal Near Miss Analysis in Three Hospitals of Nepal: An Assessment Using Three Delays Model. J Nepal Health Res Counc. 2021;19(2):264-9. Available from: https://elibrary.nhrc.gov.np/handle/20.500.14356/1099

15. Riese S, Dhakal P. Understanding the Three Delays Among Postpartum Women at Health Facilities in Nepal: Further Analysis of the Nepal Health Facility Survey 2021. DHS Further Analysis Reports. 2023;No. 144. DOI: 10.13140/RG.2.2.28387.57123

16. Chaudhary N, Mehrotra S, Solanki V, Singh U. Revisiting "3 Delays Model" for Hypertensive Maternal Mortality. J Obstet Gynecol India. 2025;75(1):56-63. DOI: 10.1007/s13224-025-02158-w

17. Vidler M, Qureshi RN, Eng D, Oladapo OT, Millum J, von Dadelszen P. Transitioning From the Three Delays to Continuity of Care: A Qualitative Study Using Verbal Autopsy Narratives. BMC Pregnancy Childbirth. 2023;23:603. DOI: 10.1186/s12884-023-06055-w

18. Joseph DM, Rwegoshora H, Mtae H. Application of Three Delays Model on Maternal Mortality in Longido District. East Afr J Educ Soc Sci. 2024;5(3):314-21. DOI: 10.46606/eajess2024v05i03.0377

19. Dafroyati Y, et al. Causes of Maternal Mortality Based on the Three-Delays Model: A Retrospective Observational Study. Journal Eduvest. 2023;3(12):2096-106. DOI: 10.36418/eduvest.v3i12.1041

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