

Ukraine War - Kill ratios for tanks, armored vehicles and artillery: #49/73



April 2024

Tanks, armored vehicles and artillery

- 1. Tanks also called main battle tanks** are armoured vehicles that have the largest close combat gun on the battlefield - 120mm shells are NATO standard for new tanks
 - **Tanks have high mobility** and can target other vehicles and bunkers at 2 to 4 kilometres away with precision like 1 or 2 meters
 - Tanks typically have a 3 person crew. 1 driver, 1 gun controller and one gun feeder
- 2. Armoured vehicles** come in all kinds of varieties
 - A common variety is **infantry fighting vehicles** typically equipped with a 25 mm heavy machine gun and anti-tank rockets like the Bradley. It has a crew of 3 - driver, machine gunner and rocket shooter plus a number of infantry passengers typically 8
- 3. Artillery** also come in all kinds of varieties
 - Typical heavy artillery is 155mm howitzers that typically can shoot 30km like the PanzerHauser.
 - HIMARS is rocket artillery with 80km range & precision. Short range artillery is mortars 8km.



Kill ratios for entire Ukraine war

- All links to data sources can be found in excel spreadsheet that can be downloaded by following link in video description to my Vlog at [hmexperience.dk](https://www.hmexperience.dk)
- **Confirmed losses** are documented at oryxspioenkop.com and unconfirmed RUS losses are reported by UKR Armed Forces
- **Russian active and passive arms stocks** are from data collected by euromaidanpress.com
- **Russian new arms production capacity** is from various sources and own estimates
- **Data considered in table is for all 26 months of the war**
- 1. They show **Ukraine killed 3.7 times more tanks** than Russia killed Ukraine tanks
- 2. **Kill ratio for armored vehicles is 2.6**
- 3. **Kill ratio for engineering vehicles are 3.0**
- Tanks, armored vehicles and engineering vehicles are killed with FPV drones, anti-tank missiles & landmines

Table 1: Kill ratios calculated for entire length of war

Number of days / months considered D 777 M 25 Type of loss	Remaining Russian active & passive stock on 11-Apr-24	Likely Russian new production daily in 2023	Losses from Feb. 24, 2022 to Apr. 11, 2024					
			Russian losses confirmed	Russian losses unconfi.	Russian avg. losses unco. per day	Months left to depletion of all stocks	Ukraine losses confirmed	Kill ratios RUS/UKR confirmed
1 Tanks	6,942	0.68	2,920	7,137	9.2	25	794	3.7
1.2 of which captured			534				131	4.1
2 Armored fighting vehicles			1,290				362	3.6
3 Infantry fighting vehicles			3,812				896	4.3
4 Armored personnel carriers			421				441	1.0
5 Other APCs (MRAPs)			54				202	0.3
6 Infantry mobility vehicles			240				432	0.6
7 Command and com vehicles			276				18	15.3
8 Total armored vehicles (2 to 7)	15,773	1.64	6,093	13,679	17.6	30	2,351	2.6
9 Engineering vehicles special equipm.	1,753	0.17	458	1,882	2.4	24	152	3.0
10 Anti-tank vehicles			44				20	2.2
11 Artillery support vehicles			116				26	4.5
12 Towed artillery			361				196	1.8
13 Self propelled artillery			715				318	2.2
14 Multiple rocket launchers			368				64	5.8
15 Total artillery (10 to 14)	9,809	1.64	1,604	11,452	14.7	22	624	2.6
16 Anti-aircraft guns			51				4	12.8
17 Self propelled anti-aircraft guns			25				14	1.8
18 Surface-To-Air Missile Systems			218				144	1.5
19 Radars			63				104	0.6
20 Jammers and deception systems			79				7	11.3
21 Total anti-aircraft (16 to 20)	2,588	0.76	436	754	1.0	89	273	1.6
22 Aircraft	1,211	0.15	108	347	0.4	90	84	1.3
23 Helicopters	831	0.26	136	325	0.4	66	43	3.2
24 Combat Unmanned Aerial Vehicles			14				27	0.5
25 Reconnaissance UAVs			342				290	1.2
26 Total UAVs (24 to 25)	-	-	356	9,104	11.7	-	317	1.1
27 Naval ships, Black Sea only	48	0.00	22	26	0.033	48	35	0.6
28 Submarines, Black Sea only	5	0.00	1	1	0.001	126	0	-
29 Trucks, Vehicles and Jeeps	-	-	3,203	15,298	19.7	-	861	3.7
30 Total equipment losses (not 26, 29)	38,961	5.31	11,778	35,603	45.8	28	4,356	2.7
31 of which destroyed			10,851				3,830	2.8
32 of which damaged			698				474	1.5
33 of which abandoned			853				223	3.8
34 of which captured			2,934				1,007	2.9
35 Killed personnel unconfirmed	24,582,000	986		450,890	580.3	1,412	166,758	2.7
36 Wounded personnel 3*killed				1,352,670	1740.9		500,274	2.7

Sources: Follow link below video to download spreadsheet containing clickable sources

- 4. **Kill ratio for artillery is 2.6** and they are killed with long-range drones and artillery



Comparing over time - tanks and armored vehicles

- Table compares data for all 26 months of war with last 10 months of war
- For tanks and armored vehicles the kill ratio respectively dropped from 3.7 to 3.4 and from 2.6 to 2.5
 - The kill rate drop can be explained by insufficient aid to Ukraine and Ukraine's summer 2023 offensive that failed because
 - Ukraine had nearly no Airforce to support it
 - Russia had build strong trenches and mine fields to defend their lines and
 - Ukraine had nearly none long-range anti-aircraft missiles to keep Russian aircraft away from frontlines dropping glider bombs and helicopters firing missiles
 - The daily Russian tank and armored vehicle losses has gone up slightly from respectively 9.2 to 10.6 and 17.6 to 20
 - Russia is attacking Ukraine much more in last 10 months which should lead to significant increase in losses but it doesn't because Ukraine are not getting enough ammunition and also because Ukraine defense lines are weak with not enough minefields, trenches & soldiers to defend them

Table 2: Comparing kill ratios - Entire war and last 10 months

Type of loss	Remaining Russian active & passive stock on 11-Apr-24	Likely Russian new production daily in 2023	Feb. 24, 22 to Apr. 11, 24		Jun. 15, 23 to Apr. 11, 24			
			Russian avg. losses unco. per day	Months left to depletion of all stocks confirmed	Russian avg. losses unco. per day	Months left to depletion of all stocks confirmed		
1 Tanks	6,942	0.68	9.2	25	3.7	10.6	22	3.4
1.2 of which captured					4.1			-
2 Armored fighting vehicles					3.6			5.3
3 Infantry fighting vehicles					4.3			4.3
4 Armored personnel carriers					1.0			0.6
5 Other APCs (MRAPs)					0.3			0.1
6 Infantry mobility vehicles					0.6			0.4
7 Command and com vehicles					15.3			11.0
8 Total armored vehicles (2 to 7)	15,773	1.64	17.6	30	2.6	20.0	26	2.5
9 Engineering vehicles special equipm.	1,753	0.17	2.4	24	3.0	4.5	13	1.7
10 Anti-tank vehicles					2.2			-
11 Artillery support vehicles					4.5			4.3
12 Towed artillery					1.8			1.9
13 Self propelled artillery					2.2			2.0
14 Multiple rocket launchers					5.8			8.4
15 Total artillery (10 to 14)	9,809	1.64	14.7	22	2.6	25.4	13	2.5
16 Anti-aircraft guns					12.8			-
17 Self propelled anti-aircraft guns					1.8			0.1
18 Surface-To-Air Missile Systems					1.5			3.3
19 Radars					0.6			0.8
20 Jammers and deception systems					11.3			9.5
21 Total anti-aircraft (16 to 20)	2,588	0.76	1.0	89	1.6	1.3	67	2.4
22 Aircraft	1,211	0.15	0.4	90	1.3	0.1	368	1.6
23 Helicopters	831	0.26	0.4	66	3.2	0.1	347	3.8
24 Combat Unmanned Aerial Vehicles					0.5			1.0
25 Reconnaissance UAVs					1.2			0.6
26 Total UAVs (24 to 25)	-		11.7		1.1	19.2		0.6
27 Naval ships, Black Sea only	48	0.00	0.033	48	0.6	0.027	61	1.1
28 Submarines, Black Sea only	5	0.00	0.001	126	-	0.003	49	-
29 Trucks, Vehicles and Jeeps	-		19.7		3.7	29.2		3.0
30 Total equipment losses (not 26, 29)	38,961	5.31	45.8	28	2.7	62.0	21	2.6
31 of which destroyed					2.8			2.6
32 of which damaged					1.5			1.3
33 of which abandoned					3.8			4.6
34 of which captured					2.9			1.1
35 Killed personnel unconfirmed	24,582,000	986	580.3	1,412	2.7	774.0	1,059	2.6
36 Wounded personnel 3*killed			1,740.9		2.7	2,322.1		2.6

Sources: Follow link below video to download spreadsheet containing clickable sources

- Data also show Russia can sustain current daily loss rates for 22 months for tanks and for 26 months for armored vehicles drawing down their remaining stocks



Comparing over time - artillery

- Table compares data for all 26 months of war with last 10 months of war
- 1. For artillery the kill ratio dropped from 2.6 to 2.5
- 2. Russian daily losses of artillery increased dramatically from 14.7 to 25.4
- 3. At current loss rate the time to depletion of remaining stocks is only 13 months
- Russian daily artillery losses has increased because
 - A) Ukraine got modern anti-artillery radar equipment and modern long-range artillery systems that fire fast and precise
 - B) Ukraine also got HIMARS but not enough
- Russia on the other hand have failed to use their counter battery radars effectively
- However, they have succeeded in deploying a much larger number of long-range drones especially the Lancet kamikaze drones that are destroying Ukraine artillery

Table 2: Comparing kill ratios - Entire war and last 10 months

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1 Tanks	6,942	0.68	9.2	25	3.7	10.6	22	3.4
1.2 of which captured					4.1			-
2 Armored fighting vehicles					3.6			5.3
3 Infantry fighting vehicles					4.3			4.3
4 Armored personnel carriers					1.0			0.6
5 Other APCs (MRAPs)					0.3			0.1
6 Infantry mobility vehicles					0.6			0.4
7 Command and com vehicles					15.3			11.0
8 Total armored vehicles (2 to 7)	15,773	1.64	17.6	30	2.6	20.0	26	2.5
9 Engineering vehicles special equipm.	1,753	0.17	2.4	24	3.0	4.5	13	1.7
10 Anti-tank vehicles					2.2			-
11 Artillery support vehicles					4.5			4.3
12 Towed artillery					1.8			1.9
13 Self propelled artillery					2.2			2.0
14 Multiple rocket launchers					5.8			8.4
15 Total artillery (10 to 14)	9,809	1.64	14.7	22	2.6	25.4	13	2.5



No more tank captures

- Ukraine captures of Russian tanks helped arm Ukraine in the beginning of the war
 - Unfortunately, Russia has learned to destroy the equipment if it is at risk of being captured by Ukraine
 - Moreover, in the past 10 months Ukraine has not taken any new land back from Russia but are slowly losing more land
 - The odd -10 and -8 is cause by correction of older data that are reclassified by closer inspection by oryxspioenkop.com
- Kill ratio for engineering vehicles** needed for offensive operations has gone from 3.0 to 1.7 most likely because of Ukraine's failed summer offensive

Table 1: Kill ratios calculated for entire length of war

Number of days / months considered D 777 M 25 Type of loss	Remaining Russian active & passive stock on 11-Apr-24	Likely Russian new production daily in 2023	Losses from Feb. 24, 2022 to Apr. 11, 2024					
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8 Total armored vehicles (2 to 7)	15,773	1.64	6,093	13,679	17.6	30	2,351	2.6
9 Engineering vehicles special equipm.	1,753	0.17	458	1,882	2.4	24	152	3.0

Table 2: Kill ratios calculated for last 10 months of war

Number of days / months considered D 301 M 9 Type of loss	Remaining Russian active & passive stock on 11-Apr-24	Likely Russian new production daily in 2023	Losses from Jun. 15, 2023 to Apr. 11, 2024					
			Russian losses confirmed	Russian losses unconfi.	Russian avg. losses unco. per day	Months left to depletion of all stocks	Ukraine losses confirmed	Kill ratios RUS/UKR confirmed
1 Tanks	6,942	0.68	877	3,182	10.6	22	261	3.4
1.2 of which captured			-10				-8	-
2 Armored fighting vehicles			405				77	5.3
3 Infantry fighting vehicles			1,410				325	4.3
4 Armored personnel carriers			105				167	0.6
5 Other APCs (MRAPs)			11				116	0.1
6 Infantry mobility vehicles			49				110	0.4
7 Command and com vehicles			33				3	11.0
8 Total armored vehicles (2 to 7)	15,773	1.64	2,013	6,012	20.0	26	798	2.5
9 Engineering vehicles special equipm.	1,753	0.17	148	1,363	4.5	13	87	1.7



Population and GDP in 2023

Country	Russia	Ukraine	Ratio R/U	USA	EU
Population mill.	145	35	4.1	335	448
GDP billion USD	2,240	161	13.9	25,440	19,350

Sources: Follow link below video to download spreadsheet containing clickable sources



Increasing Ukraine's kill ratios: Tanks & armoured v.

- **Increasing Ukraine's kill ratios for tanks and armored vehicles in 2024 and beyond:**
- 1. **#1 killer in 2024** is already small FPV drones with strapped on RPG costing about 1,000 USD (600 to 1500)
- **Ukraine now use about 3000 FPV drones per day (1M YR, 1B USD).** If only 10% hit either infantry or equipment it means 300 kills per day by small FPV drones alone
- **To repeat, Russia's daily unconfirmed** total equipment losses are 62 plus 774 daily personal kills and 2322 daily wounded plus 30 losses of non-armored vehicles
- **If Ukraine and allies spend just 10 billion USD on small drones (entirely possible)** that would be enough for 10 million drones per year or 30,000 per day with 3,000 successful kills per day assuming 10%!
- Russia will try to do the same and make 10 million small FPV drones per year
- **However, Russia can't make the needed controller chips, the communication chips and the battery packs**
- Russia has to import **these items that are only made in China or the free part of world**
- **If China will not sell, Russia cant make 10 million FPV and massive volume makes it easy to enforce sanctions**



- 2. **Also FPV drones can be made much more effective at hitting targets using better technology so instead of 10% you get >30%**
 - **Better battery packs with more energy** can increase range and time or size of warhead
 - **Better communication chips and antennas** can be more resilient to EW (electronic warfare)
 - **The control chips can be upgraded** to use AI target identification, AI homing and AI navigation using maps instead of relying on GPS and human control via radio
 - **AI will only be possible on larger drones because compute chips will require 100 watt**



Increasing Ukraine's kill ratios: Tanks & armoured v.

- **Increasing Ukraine's kill ratios for tanks and armored vehicles in 2024 and beyond:**
- Kill ratios increase when 1) you get better at killing the enemy and 2) you get better at defending yourself from being killed
- 1. #1 reason Ukraine lose tanks and armored vehicles is that Ukraine lacks sufficient anti-aircraft and EW capability to defend effectively against small FPV drone attacks and Russian helicopters using long-range anti-tank rockets
- **Solution is obvious:** Ukraine needs more EW systems and anti-aircraft guns and missile systems like the German Gepard gun and US Patriot system
- **Also Ukraine needs modern aircraft** that are vastly superior to Russian aircraft and that are highly able to avoid or deflect Russian anti-aircraft systems
- Ukraine will soon get the F16 fighters but it would be better if we could give them F35 fighters that are radar "invisible" and have better radars
- **To defend effectively against 10s of thousands of daily attacks by FPV drones** every armored vehicle on the frontline will need to have an anti-aircraft gun as their primary weapon and some EW capability



Main killers above & main defenders below



Increasing Ukraine's kill ratios: Artillery

- **Increasing Ukraine's kill ratios for artillery in 2024 and beyond:**
- **Ukraine getting better at killing Russian artillery by:**
 1. **Scaling up what is already proven to work.** So Europe need to supply more counterbattery radars, surveillance drones and fully automated artillery
 2. Copying Russia's success with the **Lancet drone** by developing a similar drone for Ukraine to use
- **Ukraine getting better at defending its own artillery by:**
 1. The Lancet drone is the #1 artillery killer for Russia so it is obvious to **deploy artillery together with short-range anti-aircraft guns and EW systems** that can protect against Lancet like drones
 2. **Go away from towed and manually loaded artillery** towards self propelled fully automatic artillery that can fire quickly and move position right after. Best defense is invisibility
 3. **Radar surveillance of airspace** to detect Lancet like drones early on and send a fast airplane that can shoot it down with its machine gun before it reach its target



Main killers above & main defenders below



Sources/attribution for previous slides

- Sources for kill rate data: GoTo www.hmexperience.dk look up video #23 and download excel spreadsheet with data and clickable links to sources
- Main source for confirmed Russian material losses: <https://www.oryxspioenkop.com/2022/02/attack-on-europe-documenting-equipment.html>
- Main source for confirmed Ukrainian material losses: <https://www.oryxspioenkop.com/2022/02/attack-on-europe-documenting-ukrainian.html>
- Other key source for unconfirmed Russian losses: <https://www.minusrus.com/en>
- Effectiveness of FPV drones without AI homing 10% and 25% with AI homing: <https://euromaidanpress.com/2023/08/17/ukraine-develops-autonomous-fpv-drones-photos/>
- 405,000 dead US soldiers for all of WW2: https://en.wikipedia.org/wiki/United_States_military_casualties_of_war
- 14 million Russians died in WW2 both soldiers and civilians: https://en.wikipedia.org/wiki/World_War_II_casualties#Soviet_Union
- Lancet drone by Russia: https://en.wikipedia.org/wiki/ZALA_Lancet
- US HARM anti-radar missile: https://en.wikipedia.org/wiki/AGM-88_HARM
- NASAMS: <https://en.wikipedia.org/wiki/NASAMS>
- Russian helicopters has been upgraded with extended range anti-tank missiles in 2023: [Extended Range Russian 'Khrizantema' Air-to-Ground Missile Debuts on Ka-52M, Mi-28NM Helicopters \(defensemirror.com\)](#)

