

Ukraine War - Kill ratios for airplanes, helicopters, UAVs and anti-aircraft #51/77



June 2024

Airplanes, helicopters UAVs and anti-aircraft

- 1. Airplanes are likely the most versatile and powerful weapon there is in modern war**
 - **Fighters** are used to drop bombs, fire missiles, fight enemy aircraft, shoot down large and slow flying drones and cruise missiles and conduct EW
 - **Bombers** are used to drop heavy bombs, fire large missiles and in some cases conduct powerful EW
 - **Radar and control** aircraft can monitor both ground and airspace far away and direct missiles and airplanes to their targets or away from threats
- 2. Helicopters** are used for front-line attacks using small missiles and for transporting troops
- 3. UAVs off all sizes and capabilities** are increasingly becoming the most deadly and effective weapon for both short and long-range attacks and they cost far less than manned aircraft or missiles
- 4. Anti-aircraft weapons including EW** are increasingly needed because of the explosive growth in the use of UAVs off all sizes
 - Russia and Ukraine experience increasingly inability to defend against UAVs as growth in UAVs far exceeds growth in anti-aircraft systems



Kill ratios for entire Ukraine war

- All links to data sources can be found in excel spreadhead that can be downloaded by following link in video description to my Vlog at 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 of the war from February 2022 to April 2024**
1. They show **Ukraine killed 1.3 times more aircraft** than Russia killed Ukraine aircraft
 2. **Kill ratio for helicopters is 3.2**
 3. **Kill ratio for UAVs is 1.1** but these data are not reliable because definition is unclear and very few confirmed kills to unconfirmed kills
 4. **Kill ratio for total anti-aircraft is 1.6**

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				Kill ratios RUS/UKR confirmed	
			Russian losses confirmed	Russian losses unconfi.	Russian avg. losses unco. to depletion per day	Months left to depletion of all stocks		Ukraine losses 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

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



Comparing kill ratios over time: Aircraft

1. **Russian aircraft losses per day** have dropped from 0.4 to 0.1 below Russia's 0.15 replacement rate but on plus side Ukraine has improved the killing rate from 1.3 to 1.6 because:

- 1) Russia are increasingly using **glider bombs** like the 500 kg FAB-500/UMPK that are dropped out of range for Ukraine's short and mid-range anti-aircraft systems like the NASAMS
- 2) Russia are **replacing aircraft attacks** with attacks using drones like the Shahed and long-range missiles like Iskander, Kh-101 and Kalibr
- 3) Ukraine also started using glider bombs to get out of harms way of Russian short and mid-range anti-aircraft systems but very limited so far
- **For Ukraine to hit more Russian aircraft** they need more long-range anti-aircraft systems like the Patriot. Will also end the glider bomb attacks
- **Ukraine also need modern aircraft preferable the F35** that is able to avoid Russian anti-aircraft
- **IMO Europe should** use its Airforce to attack Russian aircraft and army on Ukraine territory
- **Note:** Data could be flawed because Ukraine now attack aircraft far behind enemy lines using own drones and western missiles like US, ATACAMS

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 of all stocks	Kill ratios RUS/UKR confirmed	Russian avg. losses unco. per day	Months left of all stocks	Kill ratios RUS/UKR 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
					0.6			0.4
					15.3			11.0
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

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

Proprietary. © H. Mathiesen. This material can be used by others free of charge provided that the author H. Mathiesen is attributed and a clickable link is made visible to the location of used material on www.hmexperience.dk



Comparing kill ratios over time: Helicopters

2. **Russian helicopter** losses has dropped from 0.4 to 0.1 daily again below Russia's ability to make new helicopters at 0.26 but on plus side Ukraine has improved the killing rate from 3.2 to 3.8 because

- 1) Russia have upgraded their Ka-52M and Mi-28NM combat helicopters with longer range anti-tank missiles like the 15 km LMUR that enable them to stay out of range of Ukrainian short-range air-defences
- 2) The increasing kill rate for Ukraine is likely because Ukraine have less helicopters to use and if you do not use them they are not destroyed
- For Ukraine to hit more Russian helicopters** they need more long-range anti-aircraft systems like the Patriot
- The forthcoming F16** with longer range anti-aircraft missiles like the AMRAAM 120 with 105 km range will also help

Table 3: 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	Kill ratios RUS/UKR confirmed	Russian avg. losses unco. per day	Months left to depletion of all stocks	Kill ratios RUS/UKR 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								
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

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

Proprietary. © H. Mathiesen. This material can be used by others free of charge provided that the author H. Mathiesen is attributed and a clickable link is made visible to the location of used material on www.hmexperience.dk



Comparing kill ratios over time: UAVs

3. **Data on UAV losses are poor quality** because **very few confirmed losses** (less than 400 and definition of UAV is unclear) so **calculated kill ratio is not reliable**

- **Daily Russian UAV losses is also unreliable** because despite unconfirmed UAV losses are plentiful (>8000) it is still unclear what kind of UAVs that are measured
- Because of poor data quality for UAVs I will not comment on the data that exist
- **But, it is clear that UAVs are massively used by Russia and Ukraine** and both are in a race to further increase their use to many millions yearly
- **For Ukraine to destroy more Russian UAVs they need far more electronic warfare equipment and anti-aircraft guns with exploding munition that triggers by proximity and/or time fuses**
- **Fast airplanes say F16s can also be used to hunt for and shoot down slow flying drones like the Shahed using their machine gun**
- **Need for anti-aircraft guns are so big that IMO in the future all armored vehicles will need to have an anti-aircraft gun or the drones will win**

Table 3: 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	Kill ratios RUS/UKR confirmed	Russian avg. losses unco. per day	Months left to depletion of all stocks	Kill ratios RUS/UKR confirmed
1 Tanks	6,942	0.68	9.2	25	3.7	10.6	22	3.4
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

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

Proprietary. © H. Mathiesen. This material can be used by you if you are a member of the author's private club. is attributed and a clickable link is made visible to the location of used material on www.hmexperience.dk



Comparing kill ratios over time: Anti-aircraft

4. Russia are loosing more **anti-aircraft systems** from 1 to 1.3 daily and Ukraine has improved the killing rate from 1.6 to 2.4 because

- 1) Ukraine got modern anti-radar missiles like **US HARM** and they got **HIMARS** and more surveillance drones spotting targets 20-40 km behind frontlines
- 2) **Ukraine also got long-range missiles like UK-French Storm Shadow** but far from enough to hit all Russian air defenses deep behind enemy lines
- For Ukraine to hit more Russian anti-aircraft systems** they need more long-range missiles in particular **US ATACMS** and **German Taurus**
- Ukraine also need **more long-range anti-aircraft systems like Patriot** to replace mid-range anti-aircraft systems like **NASAMS** at the front lines that can be targets for Russian artillery, lancet drones and missiles
- Current drone wars** makes anti-aircraft far more important than ever why all vehicles need them

Table 3: Comparing kill ratios - Entire war and last 10 months

Type of loss	Remaining	Likely	Feb. 24, 22 to Apr. 11, 24			Jun. 15, 23 to Apr. 11, 24		
	Russian active & passive stock on 11-Apr-24	Russian new production daily in 2023	Russian avg. losses unco. per day	Months left to depletion of all stocks	Kill ratios RUS/UKR confirmed	Russian avg. losses unco. per day	Months left to depletion of all stocks	Kill ratios RUS/UKR confirmed



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)					1.6		1.3	67	2.4
22 Aircraft	2,588	0.76	1.0	89	1.6	0.1	368	1.6	1.6
23 Helicopters	1,211	0.15	0.4	90	1.3	0.1	347	3.8	3.8
24 Combat Unmanned Aerial Vehicles	831	0.26	0.4	66	3.2				1.0
25 Reconnaissance UAVs					0.5				1.2
26 Total UAVs (24 to 25)					1.1		19.2		0.6
27 Naval ships, Black Sea only	-		11.7		1.1				0.6
28 Submarines, Black Sea only	48	0.00	0.033	48	0.6	0.027	61	1.1	1.1
29 Trucks, Vehicles and Jeeps	5	0.00	0.001	126	-	0.003	49	-	-
			19.7		3.7	29.2		3.0	3.0
			45.8	28	2.7	62.0	21	2.6	2.6



Cutaway of the 40mm 3P shell. The sophisticated fuse and sensors are in the nose. Note the 1,100 pre-fragmented tungsten pellets that surround the 120g PBX charge. When detonated, these are sprayed outward in a lethal cloud of metal that can destroy the delicate systems of missiles or aircraft or take out small boats and personnel. (Image: BAE Systems).

can be used by others free of charge provided that the author H. Mathiesen be visible to the location of used material on www.hmexperience.dk

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>
- 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 'Khризantema' Air-to-Ground Missile Debuts on Ka-52M, Mi-28NM Helicopters \(defensemirror.com\)](https://www.defensemirror.com/extended-range-russian-khризantema-air-to-ground-missile-debuts-on-ka-52m-mi-28nm-helicopters)

